Operator's Manual

McCORMICK

FARMALL

M and MV

INTERNATIONAL HARVESTER COMPANY
180 North Michigan Ave. Chicago, Illinois, U.S.A.

TO THE OWNER

By selecting an International Harvester tractor as your new power partner, you have purchased a product of one of the world's foremost manufacturers of farm equipment. We feel sure you will obtain from this machine the economical and superior performance it is designed to give. It is certain that you will derive a large measure of personal satisfaction from operating it.

Years of tractor manufacturing experience and actual contact with agricultural problems in the field have been combined with advancements in engineering and metallurgical science to produce all the features and refinements built into your tractor. The liberal use of precision-type bearings, the heavy-duty crankshaft, force-feed lubrication, dependable ignition, extra-large flywheel and the efficient air, oil and fuel cleaners are some of the features that give your tractor its eager power to do all your power jobs with thoroughness, speed and economy. Properly adjusted, operated, and maintained, this tractor will respond to every reasonable demand you make upon it and give you reliable service for years to come.

A complete list of parts will be supplied on request.

It is the policy of International Harvester Company to improve its products whenever it is possible and practical to do so. We reserve the right to make changes or add improvements at any time without incurring any obligation to make such changes on tractors sold previously.

All illustrations and descriptive matter in this publication apply to International Harvester products sold under the McCormick, McCormick-International, McCormick-Deering, or McCormick-Deering International trade name.

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INTRODUCTION

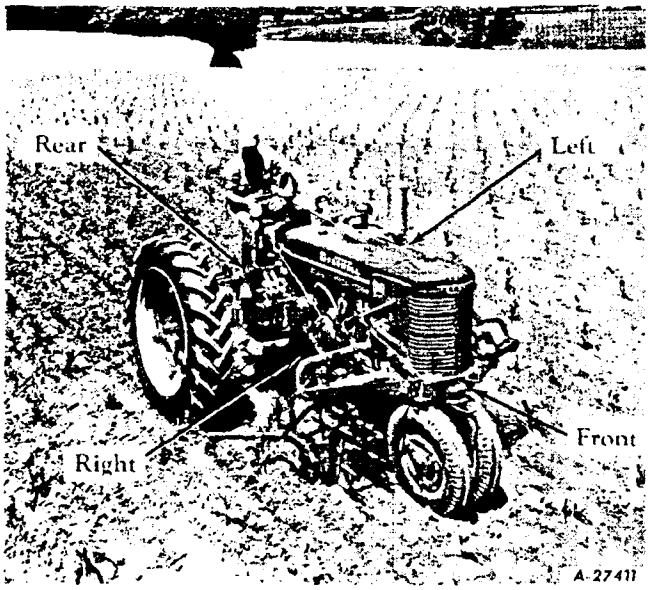
Assembled in this book are operating and maintenance instructions for the Farmall M and MV. This material has been prepared in detail in the hope that it will prove helpful to you in providing a better understanding of the correct care and efficient operation of your tractor.

If you should need information not given in this manual, or require the services of a trained mechanic, get in touch with the International Harvester dealer in your locality. Dealers are kept informed on the latest methods of servicing tractors. They carry stocks of IH parts, and are backed in every case by the full facilities of a nearby International Harvester District Office.

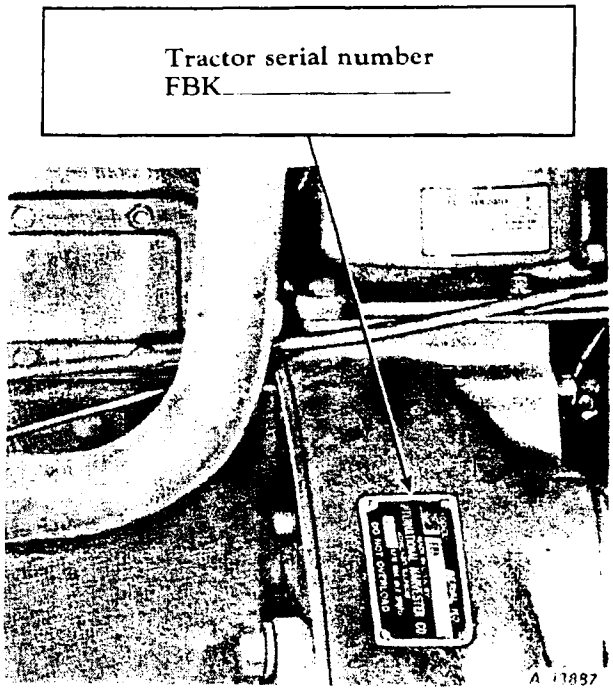
Throughout this manual the use of the terms LEFT, RIGHT, FRONT, and REAR must be understood to avoid confusion when following instructions. LEFT and RIGHT indicate the left and right sides of the tractor when facing forward in the driver's seat. Reference to FRONT indicates the radiator end of the tractor, and REAR the drawbar.

The illustrations in this manual are numbered to correspond with the pages on which they appear; for example, *Illusts. 6 and 6A are on page 6.*

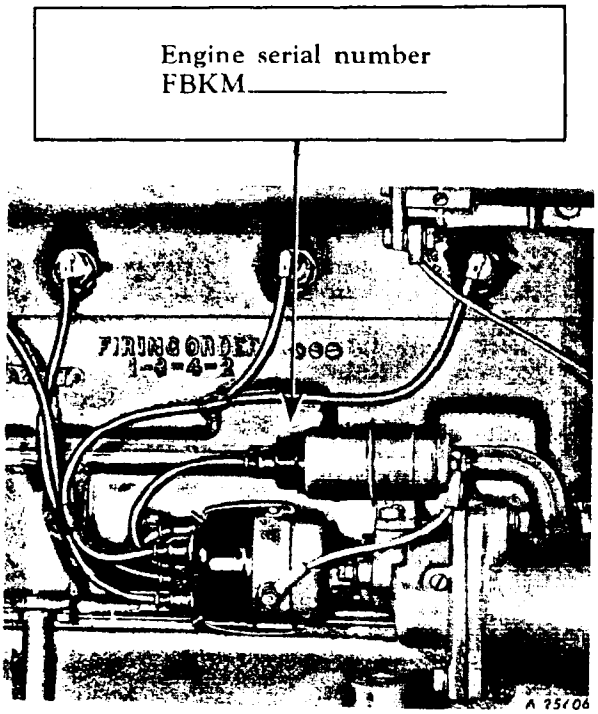
When in need of parts, always specify the tractor and engine serial numbers. The tractor serial number is stamped on a name plate attached on the left side of the clutch housing. The serial number is preceded by the letters FBK for the Farmall M and FBKV for the Farmall MV. *See Illust. 2.* The engine serial number is stamped on the right side of the engine crankcase above the battery ignition unit. This serial number is preceded by the letters FBKM for the Farmall M and FBKVM for the Farmall MV. *See Illust. 2A.*



For ready reference we suggest that you write these serial numbers in the spaces provided below. The prefix letters printed in the boxes below are for the Farmall M; for the Farmall MV, change them accordingly.

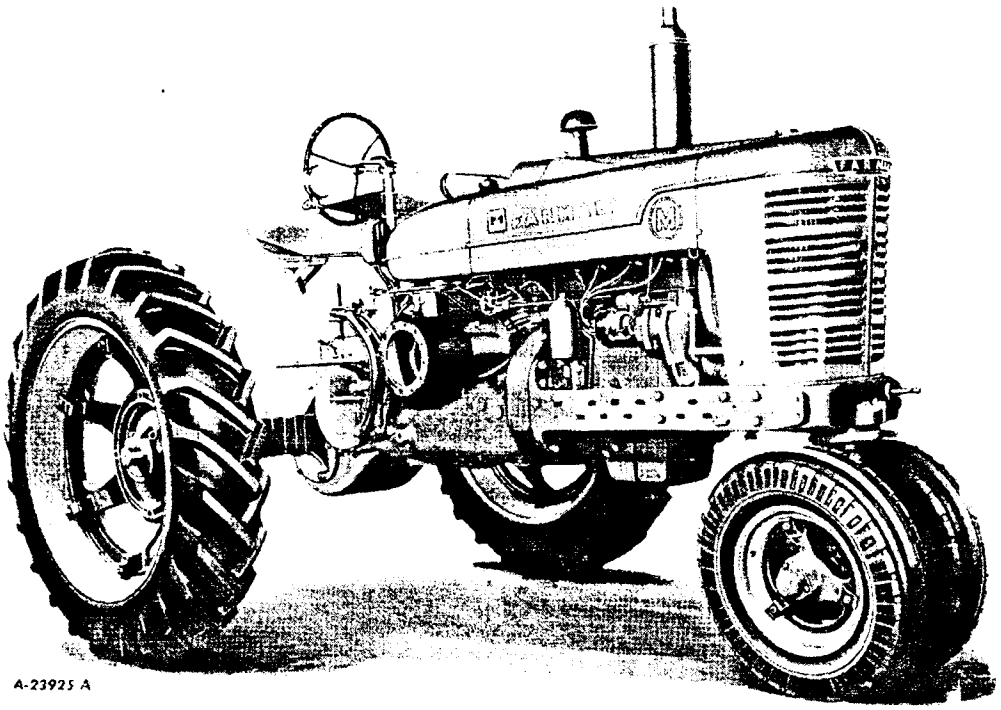


Illust. 2
Location of tractor serial number.

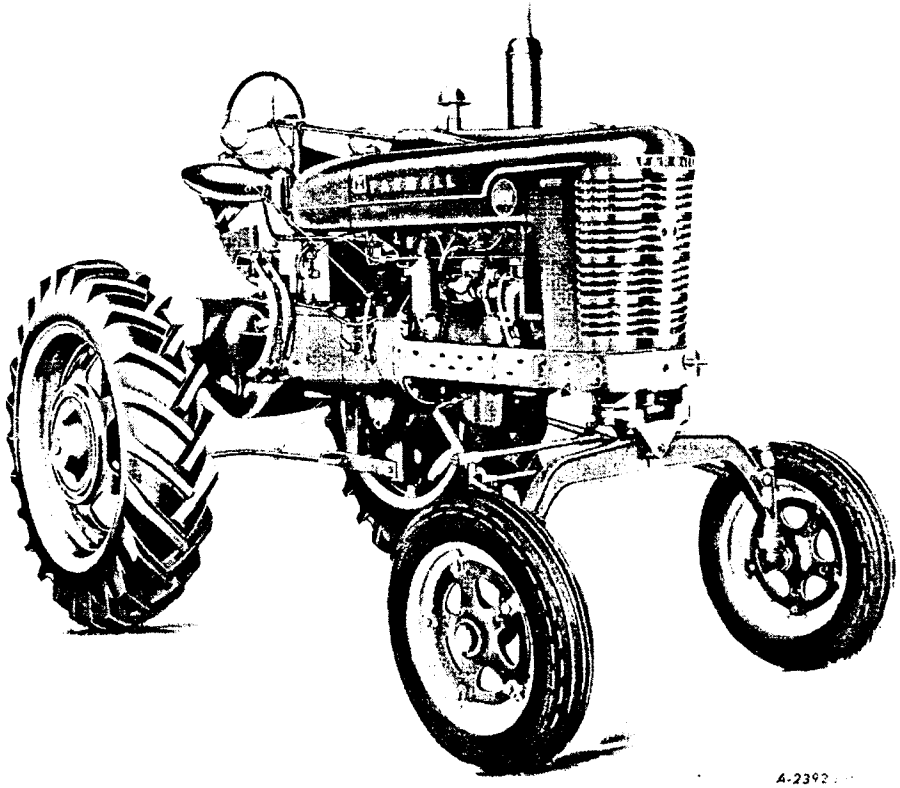


Illust. 2A
Location of engine serial number.

DESCRIPTION



Illust. 3
Right front view of the Farmall M.

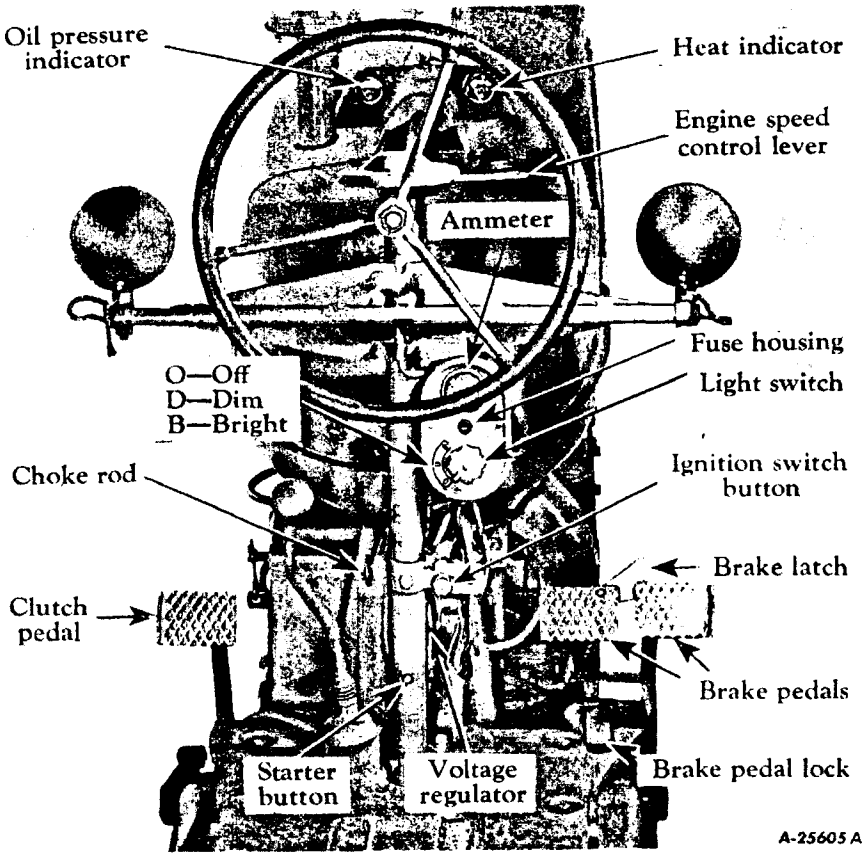


Illust. 3A
Right front view of the Farmall MV.

DESCRIPTION

Instruments and Controls

A variety of special equipment is available for use with the Farmall M and MV. The instructions for operating and maintaining the special equipment have been included in the instructions for operating and maintaining the tractor. Disregard the instructions for special equipment not on your tractor.



Illust. 4
Location of controls.

Brake Pedals

These pedals are used to stop the tractor, to hold the tractor in a stationary position, or to assist in making sharp turns as outlined below:

To stop the tractor, depress both pedals at the same time. Before driving the tractor in high gear, always latch the pedals together.

To hold the tractor in a stationary position, latch the pedals together, depress and lock them in this depressed position by using the brake pedal lock.

To assist in making a sharp turn, operate the pedals individually, depressing the pedal on the side toward which the turn is to be made.

The brake pedal latch (*Illusts. 4 and 16*) is used to latch both brake pedals together, causing the brakes to operate simultaneously.

Caution! Always latch the brake pedals together when driving the tractor in high gear (5th speed). To latch the pedals together, engage the latch (located in back of left pedal, *Illust. 16*) in the slot in back of the right pedal. When brake pedals are not latched together, the latch should rest in the slot in back of the left brake pedal.

The brake pedal lock (*Illust. 16*) is used to lock the brake pedals in the depressed position which prevents the tractor from moving.

Clutch Pedal

This pedal, when depressed all the way, disengages the engine from the transmission.

Choke Rod

The choke rod makes it possible to regulate the carburetor choke from the driver's seat. Pulling out on the choke rod closes the carburetor choke for starting the engine; pushing it back in opens the choke.

Carburetor Choke Lever

(Tractors without Starting Motor)

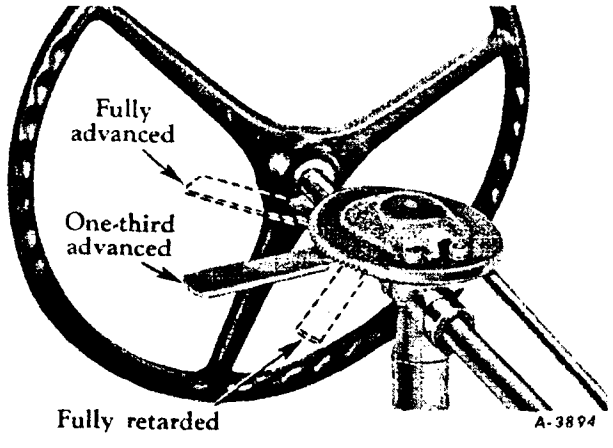
The carburetor choke lever controls the air supply to the carburetor. When the choke lever is moved toward the rear (closed position), the air supply is cut off, thereby enriching the fuel mixture for starting the engine. Move the carburetor choke lever all the way to the rear before cranking the engine. Moving the choke lever forward opens the choke for normal engine operation.

Engine Speed Control Lever

This lever controls the speed of the engine and, when set in a given position, will maintain a uniform engine speed even though the engine load may vary.

The rated or maximum full load governed speed is 1450 r.p.m.; maximum idle speed is approximately 1595 r.p.m.; minimum idle speed (hand throttle) is 400 to 450 r.p.m. with the engine speed control lever fully retarded. *See Illust. 5.* Never operate the engine at more than the regular governed speed. Excessive speeds are harmful.

The governor is set at the factory and should require no adjustment. Consult your International Harvester dealer if the governor does not function properly.



Illust. 5
Various positions of the engine speed control lever.

Oil Pressure Indicator

This indicator (*Illusts. 4 and 5A*) shows whether lubricating oil is circulating through the engine. The indicator needle should be in the white area when the engine is running (*Illust. 5A*). If it is not in the white area, stop the engine immediately and investigate the cause of the oil pressure failure. If you are unable to find the cause, be sure to consult your International Harvester dealer before operating the engine.

Illust. 5A
Oil pressure indicator, showing needle in correct operating position.

Ignition Switch Button

This button closes and opens the electrical circuit for operating and stopping the engine. Pull the button out for operating and push it in to stop the engine.

Caution: On tractors with battery ignition, when the engine is not operating or the engine has stalled and the operator leaves the tractor, the ignition switch button must be pushed all the way in, so that the switch is in the "off" position, to prevent battery discharge.

Starter Switch Button

To start the engine, adjust the choke rod and press down on the starter switch button as explained *on page 10.*

Light Switch

The switch has three positions: "D"—dim lights; "B"—bright lights; and "O"—off.

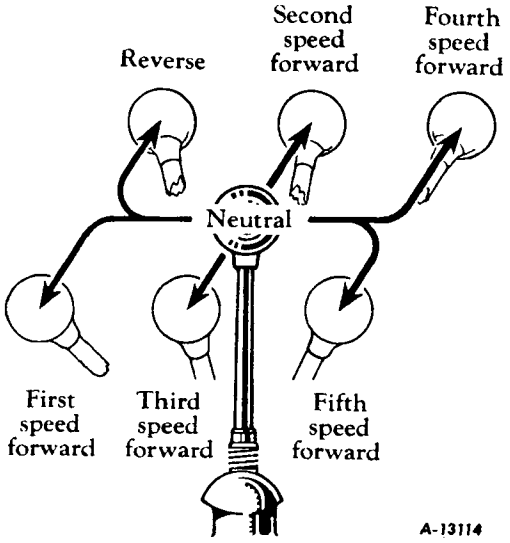
Ammeter

This instrument indicates the charging rate of the generator or the discharge rate of the battery. If it shows discharge continuously, investigate the cause to avoid completely discharging the battery and possible damage to the generator. *Refer to pages 46 to 57* for additional information on electrical equipment.

Gearshift Lever

This lever is used to select the various gear ratios in the transmission. There are five forward speeds and one reverse speed. *See Illust. 6.*

Note: The fifth speed is locked out when steel wheels are used; for further instructions *refer to page 16.*



Illust. 6

Gearshift positions.

Power Take-Off Shifter Rod

The shifter rod is used to engage or disengage the power take-off. *Refer to pages 16 and 17* for operating instructions.

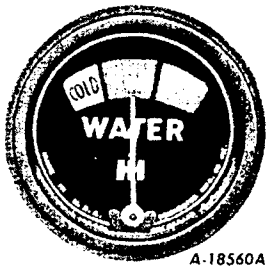
Radiator Shutter Control Crank

The control crank opens and closes the radiator shutter, controlling the engine temperature. Turn the crank counterclockwise to close the shutter and clockwise to open the shutter.

Note: Tractors with gasoline engines are not regularly equipped with this feature.

Heat Indicator

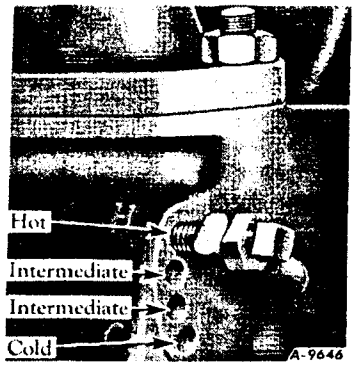
This indicator (*Illusts. 4 and 6A*) registers the temperature of the liquid in the cooling system. The indicator pointer should be in the center of the "RUN" range (*Illust. 6A*) for engines using distillate or kerosene for fuel, and on the low side of the "RUN" range for engines using gasoline for fuel.



Illust. 6A

Heat indicator in correct operating position when operating on distillate or kerosene.

Manifold Heat Control Lever



Illust. 6B

Heat control valve set in hot position (distillate or kerosene engines only).

This control lever (*Illust. 6B*) is used only on distillate or kerosene engines. For normal operation, set the lever in the top notch "HOT" position. If the distillate or kerosene engine is to be operated on gasoline, set the control lever in the bottom notch "COLD" position, and remove the manifold shield. For complete instructions *refer to pages 12 to 14.*

Before Starting Your New Tractor

Lubrication

Lubricate the entire tractor, using the *"Lubrication Guide"* (*page 22*) as a guide.

Check the oil levels of the engine crankcase, air cleaner, transmission, belt pulley housing, and all gear cases to see that they are filled to the correct levels with the proper grade of oil for the prevailing temperature. *Refer to the "Lubrication Guide" on page 22, and to the specifications of lubricants on pages 29 and 30.*

Tractors shipped to destinations in the United States of America, Canada and Mexico are filled with oil in all parts before leaving the factory. Engines are filled with a light engine oil. However, this is for preservative purposes only and is not suitable for regular service. The original oil should be drained from the crankcase and air cleaner and replaced with the required amount of fresh oil for the prevailing temperature.

Tractors packed for export have all oil drained from the engine crankcase, air cleaner and all gear cases.

Before starting the engine for the first time, remove the spark plugs and put about one teaspoonful of crankcase oil into each cylinder; replace the spark plugs and crank the engine to distribute the oil over the cylinder walls. This assures positive lubrication of the cylinders and pistons immediately after starting and eliminates the possibility of scoring.

Pneumatic Tires

Before moving the tractor, check the air pressure in the pneumatic tires and inflate or deflate the front and rear tires to the correct operating pressures. *Refer to the chart on page 70.*

Steel Wheels

If your tractor is equipped with steel wheels, or has new wheel and lug installations, it is advisable to check and tighten the rear wheel bolts at intervals to be sure that the lugs seat properly.

Engine Cooling System

The cooling system capacity is approximately 6 U. S. gallons.

Be sure the radiator drain and crankcase water drain (*Illust. 36*) are closed, then fill the radiator to a level approximately 2¼ inches below the top of the filler neck. Filling the radiator to this level will allow for expansion of the coolant under normal operating conditions. Use clean water; soft or rain water is recommended, as it does not contain alkali, which forms scale and eventually clogs the passages.

When filling the radiator, remove the vent plug in left side of thermostat housing (*Illust. 36*) and replace the plug when water appears.

Never start or operate the engine without water or antifreeze in the cooling system except as instructed *in "Cold Weather Precautions" on page 34.*

For further information *see "Cooling System" (page 35).* If the tractor is to be operated in freezing temperatures (+32° F. or lower) *refer to "Cold Weather Precautions" on page 34.*

Fuel System

Provision is made in the design of this tractor so that it may be equipped with either a gasoline, distillate, or kerosene-burning engine. Before attempting to use a fuel for which your tractor is not designed, see your International Harvester dealer or the nearest International Harvester Company District Office for full details.

To obtain best results, use the fuel for which the tractor is designed, follow the operating instructions given for that fuel and observe the following precautions:

1. Distillate fuels should conform to International Harvester Company specifications (see your International Harvester dealer).

2. Distillate or kerosene-burning tractors should not have the shut-off valve under the auxiliary tank and the one under the main fuel tank open or even partially open at the same time, as this will permit the distillate or kerosene to mix with the gasoline, making the engine hard to start.

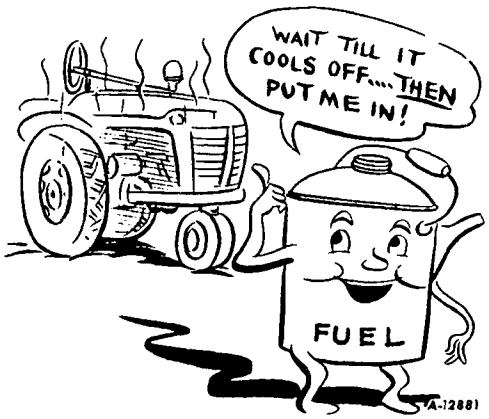
3. During the first 100 hours of operation, mix one pint of light engine oil with every five U. S. gallons of fuel.

Ignition—Electrical

Tractors shipped from the factory with starting and lighting equipment have the "battery to ground" cable disconnected and taped. Therefore, before attempting to start the engine, be sure the "battery to ground" cable is connected to the ground.

Instruments and Controls

Thoroughly acquaint yourself with all instruments and controls as described *on pages 4 to 6.*



Never refuel tractor while engine is running or extremely hot.

Preparing Your Tractor For Each Day's Work

Fuel System

Fill the fuel tank (capacity 21 U. S. gals.) preferably at the end of each day's work. This will force out any moisture-laden air and prevent condensation.

Tractors designed for distillate or kerosene operation have an auxiliary tank (capacity ⅞ U. S. gallon) for gasoline, which is used only for starting and warming up the engine. If a distillate or kerosene engine is to be operated on gasoline only, use the large fuel tank for gasoline and either shut off the small tank or use it as an auxiliary tank.

The filler caps on both fuel tanks have air vents. These vents should be kept open at all times to assure proper flow of the fuels. *See Illust. 8A.*

Illust. 8
Filling the fuel tank.

Safety First: Never fill the fuel tank when the engine is running or when near an open flame. Do not smoke or use an oil lantern when working around inflammable fuels. When pouring fuel, keep the funnel and container in contact with the metal of the fuel tank (*Illust. 8*) to avoid the possibility of an electric spark igniting the gas. Do not light matches near gasoline, as the air within a radius of several feet is mixed with a highly explosive vapor.

Cooling System

Remove the radiator filler cap and check the water level. Fill to a level approximately 2¼ inches below the top of the filler neck.

Lubrication

Air Cleaner

Change the oil in the air cleaner oil cup. Fill to the level mark with engine oil (capacity 2¼ U. S. pints).

Engine Crankcase

WHEN OPERATING ON GASOLINE, add sufficient oil to bring the oil up to the level of the upper test cock in the crankcase pan.

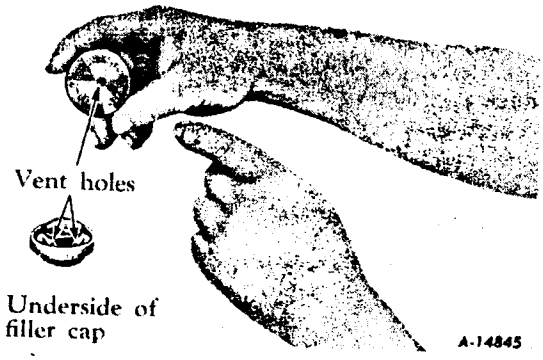
WHEN OPERATING ON DISTILLATE OR KEROSENE: Before starting your engine for the day's work, open the lower test cock in the crankcase pan and allow the oil to drain to this level. Close the lower test cock and open the upper cock in the crankcase pan. Add new oil (approximately 1 U. S. quart) until it appears at this level and then close the cock.

Grease Fittings

Refer to "Lubrication Guide" (pages 22 to 30) for complete daily lubrication requirements.

Periodic Inspections

Refer to pages 31 and 32.



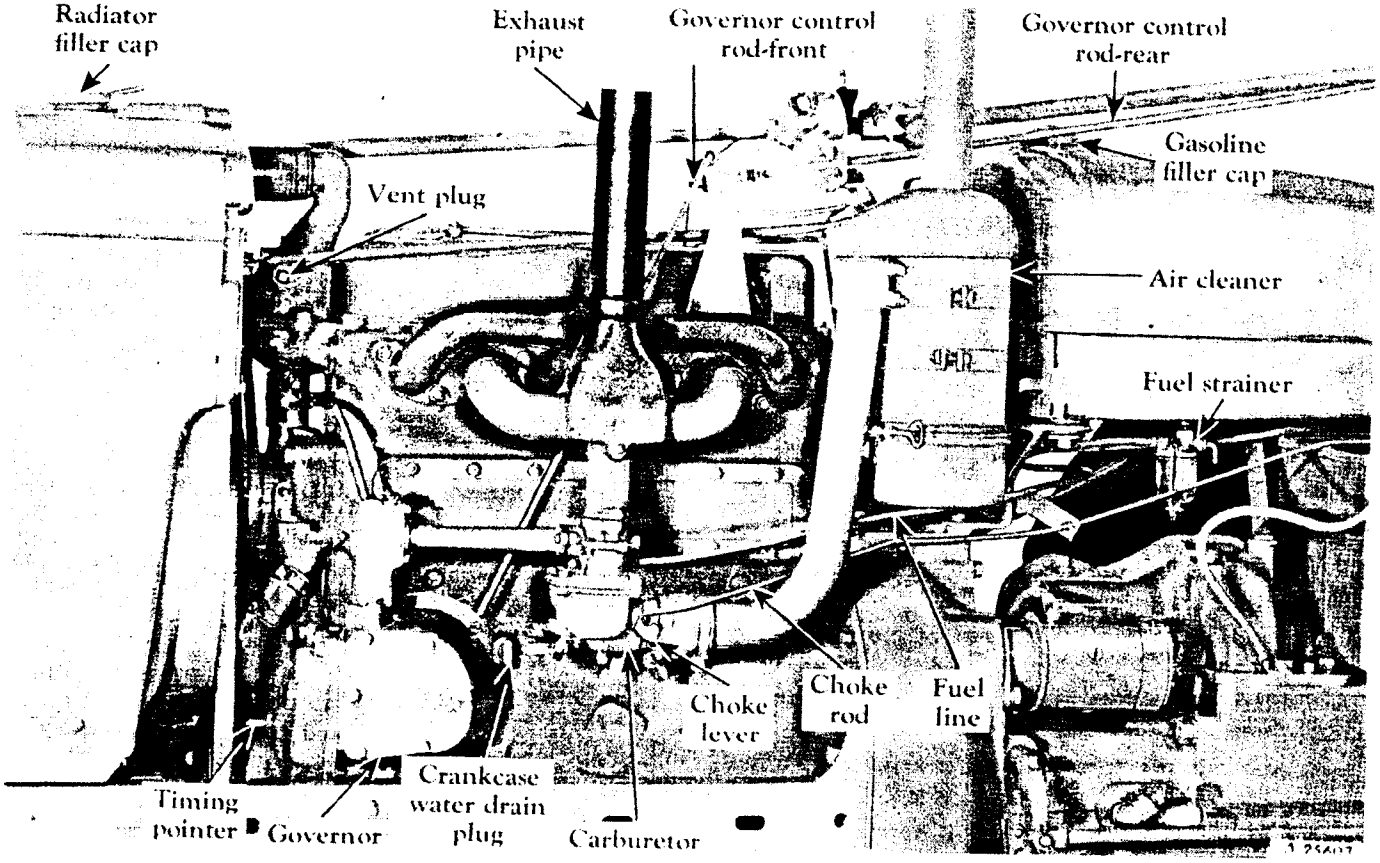
Illust. 8A
Vent holes in filler cap.

OPERATING YOUR TRACTOR

Before attempting to start or operate the tractor, be sure that you have checked over the instructions for a new tractor and thoroughly familiarize yourself with the instruments and controls.

When starting the engine in a barn or garage, keep the doors wide open as the exhaust gas from internal combustion engines contains poisonous carbon monoxide which is odorless, tasteless and colorless.

Be sure the gearshift lever of the tractor is in neutral before starting the engine.



Illust. 9
Fuel system—gasoline engine.

Operating a Gasoline Engine

Radiator Shutter

Tractors designed for gasoline engine operation are not regularly equipped with a radiator shutter but this feature can be supplied. If your tractor is so equipped, close the radiator shutter when starting the engine in cold weather; then regulate it as required to hold the needle of the heat indicator on the low side of the "RUN" range.

Fuel System

Check the gasoline tank to make sure it is full; also be sure the shut-off valve on the fuel strainer under the gasoline tank is open.

To assure against leakage or seepage when the valve is in its full open position, be sure to screw the needle stem (shut-off valve) out until the seat on the stem is tight against the stop. Use a good grade of gasoline.

Starting the Engine with the Starting Motor

1. Put the gearshift lever in neutral position. *See Illust. 6.*

2. Open the gasoline shut-off valve under the fuel tank.

3. Pull the choke rod out all the way.

4. Advance the engine speed control lever one-third. *See Illust. 5.*

5. Pull out on the ignition switch button.

6. Disengage the engine clutch by pressing down on the clutch pedal. Press in on the starter button and release it as soon as the engine starts. However, do not press the starter button for more than thirty seconds at any one time. If the engine does not start within this time, release the starter button and wait a minute or two; then try again. Slowly release the clutch pedal after the engine starts.

Hand Cranking the Engine

(Tractors without Starting Motor)

1. Put the gearshift lever in neutral position. *See Illust. 6.*

2. Open the gasoline shut-off valve under the fuel tank.

3. Close the choke by moving the carburetor choke lever back all the way toward the rear.

4. Advance the engine speed control lever one-third. *See Illust. 5.*

5. Pull the ignition switch button out.

6. Crank the engine one or two strokes, then open the choke part way.

7. Crank the engine until it starts.

Caution! When cranking the engine, be sure the gearshift lever is in neutral position and always stand in a position that will eliminate any possibility of being struck by the starting crank if there is a reversal of the direction of the engine. Crank the engine by using quick upstrokes; do not spin it.

The following instructions offer approximate requirements which may be changed to suit local conditions:

During warm weather, or with the engine warm, set the carburetor choke lever in half-open position and crank the engine, using quick upstrokes until the engine starts.

During cold weather, or with the engine cold, close the choke completely by moving the choke lever toward the rear as far as it will go and crank the engine with quick upstrokes as follows:

Six to eight lifts of the crank at temperatures 0° to 10° F.

Four to five lifts of the crank at temperatures 10° to 20° F.

Two to three lifts of the crank at temperatures 20° to 30° F.

Now open the choke halfway and crank the engine with quick upstrokes until it starts.

Note: Avoid overchoking as excessive use of the choke will flood the engine, making it hard to start. The use of the choke for starting will vary, depending on temperature and altitude.

After the Engine Starts

As soon as the engine starts, adjust the choke to a point where the engine operates without missing and, as the engine warms up, open the choke all the way by gradually pushing the choke rod all the way in or by moving the carburetor choke lever forward all the way. Do not use the choke to enrich the fuel mixture except when starting the engine.

Immediately after the engine starts, check the oil pressure indicator (*Illust. 5A*) to make sure sufficient oil is circulating through the engine. If it is not, stop the engine and inspect the oil system to find the cause of failure. If unable to find the cause, consult your International Harvester dealer before operating the engine.

Stopping the Engine

Retard the engine speed control lever by pushing it all the way forward (*Illust. 5*). Allow the engine to cool slowly from full-load operation by slowly idling the engine for a short time. Then push the ignition switch control button all the way in to stop the engine. It is advisable to close the gasoline shut-off valve if the engine is to be stopped for any length of time.

OPERATING YOUR TRACTOR

Operating a Distillate Engine on Distillate

Four steps are necessary in operating a distillate engine on distillate.

1. Setting the manifold heat control lever in the top notch "Hot" position. *See page 12.*

2. Starting the engine on gasoline.

3. Changing over to distillate fuel.

4. Changing back to gasoline before stopping the engine, to insure having gasoline in the fuel bowl for the next starting.

The above steps are fully explained in this manual; study them carefully.

Radiator Shutter

Tractors designed for operation on distillate are regularly equipped with a radiator shutter to assist in warming up a cold engine quickly and to maintain the engine at the most efficient operating temperature.

Distillate fuels are heavier than gasoline and therefore require more heat for proper vaporization. Before starting a distillate engine, close the radiator shutter completely.

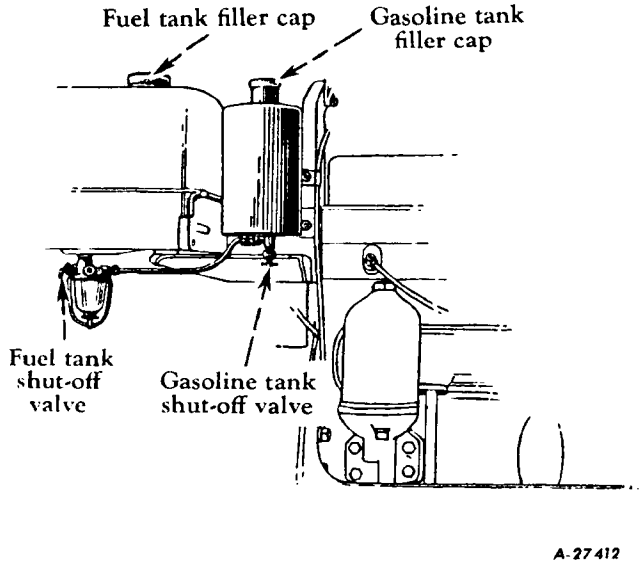
After the engine has been started, allow it to operate with the radiator shutter closed until the pointer on the heat indicator is in the center of the "RUN" section; then regulate the shutter enough to keep the pointer on the heat indicator in the center of the "RUN" section (*Illust. 6A*).

The adjustment of the shutter will vary, depending on the load the tractor is handling, length of idling periods, atmospheric temperatures, and the kind and quality of fuel that is being used.

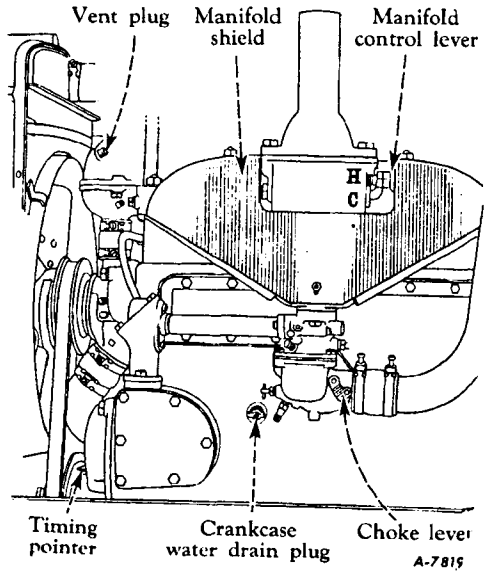
Important: Before filling the radiator in freezing weather, close the radiator shutter and start the engine; then put the water in the radiator immediately. This prevents water from freezing during the warming-up period. After the engine has warmed up, adjust the radiator shutter to maintain the operating temperature of the engine in the center of the "RUN" section on the heat indicator (*Illust. 6A*).

Fuel System

Check the fuel and auxiliary gasoline tanks to make sure they are full. Open the gasoline valve and be sure the shut-off valve for the main fuel tank is closed. (This shut-off valve should not be opened until the engine has been operating on gasoline long enough to be thoroughly warmed up.)



Illust. 11
Fuel and gasoline tanks on distillate tractor.



Illust. 11A
Left side of engine.

Do Not Mix Fuels! Do not have the shut-off valve under the auxiliary tank and the one under the main fuel tank open at the same time as this will permit the distillate fuel to mix with the gasoline, making the engine hard to start.

Before starting the engine on gasoline, be sure there is no distillate fuel in the carburetor or in the fuel strainer.

Manifold Heat Control

The distillate engine manifold is designed so the hot exhaust gases pass around the intake manifold and heat the incoming fuel mixture, resulting in maximum efficiency under all normal operating conditions.

The manifold heat control valve has four adjustment positions: (1) top notch, "HOT" position; (2) and (3) center notches, "INTERMEDIATE" positions; (4) bottom notch, "COLD" position. *See Illust. 6B.*

With these adjustments, the heat of the manifold can be regulated to suit various operating conditions, which are governed by the prevailing air temperature, the load the engine is handling, and the kind and quality of fuel that is being used.

When operating the engine on distillate, the heat control valve should be set in the top notch, "HOT" position (*Illust. 6B*). To do this loosen the nut on the heat control adjusting lever and raise the lever to the top notch. Always keep the valve in this position except when the prevailing temperature is very high, or when the engine is operating with a constant heavy load. In such cases, use either of the two "INTERMEDIATE" positions or the "COLD" position.

The manifold should be kept hot at all times to properly vaporize the heavy fuels and to avoid dilution of the crankcase lubricating oil.

Starting the Engine with the Starting Motor

1. Put the gearshift lever in neutral position. *See Illust. 6.*

2. Open the gasoline shut-off valve under the auxiliary gasoline tank and be sure the shut-off valve for the main fuel tank (*Illust. 11*) is closed.

3. Advance the engine speed control lever one third. *See Illust. 5.*

4. Close the radiator shutter.

5. Pull out on the ignition switch button.

6. Pull the choke rod all the way out.

7. Disengage the engine clutch by pressing down on the clutch pedal. Press in on the starter button and release as soon as the engine starts. However, do not press the starter button in for more than thirty seconds at any one time. If the engine does not start within this time, release the starter button and wait a minute or two, then try again. Slowly release the clutch pedal after the engine starts.

Hand Cranking the Engine

(Tractors without Starting Motor)

1. Put the gearshift lever in neutral position. *See Illust. 6.*

2. Open the gasoline shut-off valve under the auxiliary gasoline tank and be sure the shut-off valve for the main fuel tank is closed. *See Illust. 11.*

3. Advance the engine speed control lever one third. *See Illust. 5.*

4. Close the radiator shutter.

5. Pull out the ignition switch button.

6. Close the choke by moving the carburetor choke lever all the way back. Crank the engine one or two strokes; then open the choke halfway. Crank the engine until it starts.

Avoid overchoking as excessive use of the choke will flood the engine, making it hard to start. For best results follow the procedure outlined *on page 10.*

After the Engine Starts

As soon as the engine starts, adjust the choke to a point where the engine runs without missing. As the engine warms up, gradually open the choke all the way by slowly pushing the choke rod all the way in, or by moving the carburetor choke lever forward all the way. Do not use the choke to enrich the fuel mixture except when starting the engine.

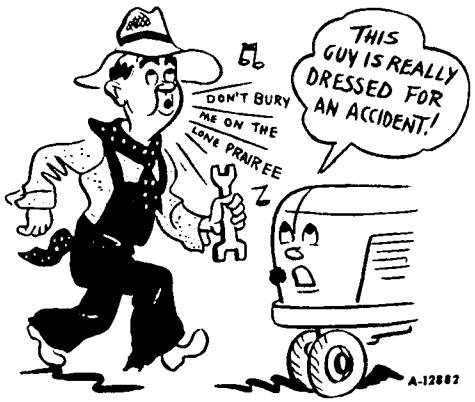
Immediately after the engine starts, check the oil pressure indicator (*Illust. 5A*) to make sure sufficient oil is circulating through the engine. If it is not, stop the engine and inspect the oil system to find the cause of failure. If unable to find the cause, consult your International Harvester dealer before operating the engine.

Changing Over to Distillate Fuel

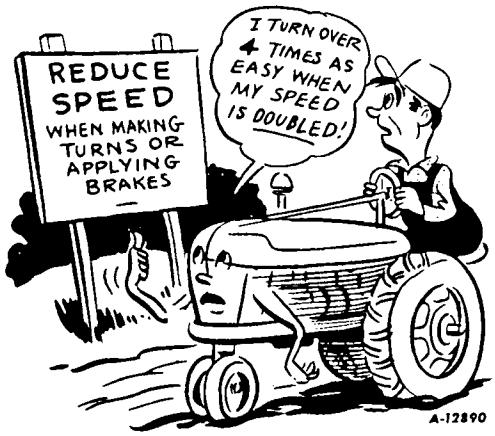
When the engine has operated a while and the needle on the heat indicator is well into the "RUN" section, change over to operate on distillate by tightly closing the gasoline shut-off valve and quickly opening the shut-off valve under the main fuel tank.

Do not operate the engine under load until it is thoroughly warmed up (when the heat indicator pointer is in the center of the "RUN" section; *see Illust. 6A*).

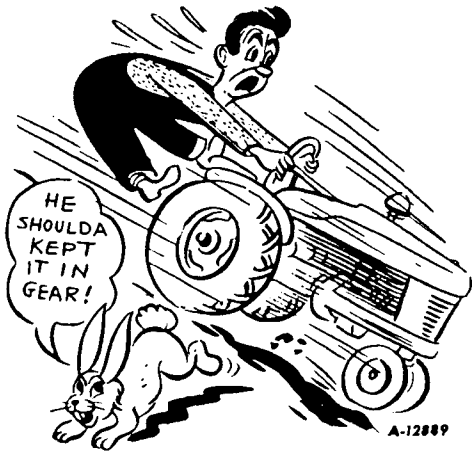
Adjust the radiator shutter so as to maintain the needle in this position.



Loose or "floppy" clothing should not be worn by the operator because of the danger of it wrapping on or getting into the moving parts.



Reduce speed before making a turn or when applying the brakes. Remember, the danger of the tractor overturning increases four times when the speed is doubled.



Always keep the tractor in gear when going down steep hills.

Stopping the Engine

Close the distillate shut-off valve and open the gasoline shut-off valve. Operate the engine two or three minutes with the engine speed control lever one-half advanced to empty the fuel lines and carburetor of distillate and fill them with gasoline. This will insure having gasoline in the fuel bowl for starting again. Retard the engine speed control lever by pushing it all the way forward and push the ignition switch button all the way in.

After the engine has stopped, it is good practice to close the gasoline shut-off valve.

To start an engine that has been stopped while operating on distillate and has cooled off, close the main fuel shut-off valve and drain the distillate from the carburetor fuel bowl and fuel strainer bowl; then proceed in accordance with the starting instructions shown *on page 12.*

Operating a Kerosene Engine

If your tractor is equipped with a kerosene-burning engine, follow the same operating instructions as outlined for distillate operation.

If a kerosene engine is to be operated on gasoline, the same instructions as for operating a distillate engine on gasoline will apply.

Operating a Distillate Engine on Gasoline

Distillate or kerosene engines may be operated on gasoline if necessary; however, more satisfactory results will be obtained when the engine is operated on the fuel for which the engine is designed.

To operate a distillate engine on gasoline, follow the same operating instructions as for distillate operation (*pages 11 and 12*) except as outlined below:

Fuel System

The 21 U. S. gallon fuel tank is used for gasoline and the small tank may be used as an auxiliary tank.

Radiator Shutter

Close the radiator shutter when starting the engine in cold weather, and as the engine warms up, regulate the shutter so the heat indicator pointer maintains its position on the low side of the "RUN" section.

Manifold Heat Control

Set the heat control valve in "COLD" position except when operating under a light load or in extremely cold weather; then the valve should be set in the lower "INTERMEDIATE" position.

Manifold Shield

Remove the manifold shield except when operating in extremely cold weather.

Stopping the Engine

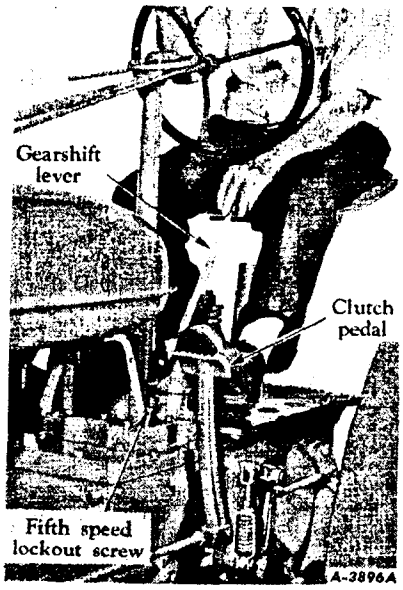
Retard the engine speed control lever by pushing it all the way forward. *See Illust. 5.* Allow the engine to cool slowly from full load operation by slowly idling the engine for a short time. Then push the ignition switch control button all the way in to stop the engine. It is advisable to close the gasoline shut-off valve if the engine is to be stopped for any length of time.

Driving the Tractor

To Start the Tractor

1. Advance the engine speed control lever slightly. *See Illust. 5.*

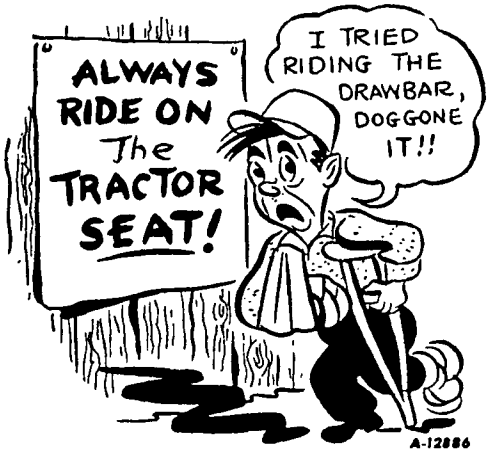
2. Disengage the clutch by pressing the clutch pedal all the way in.



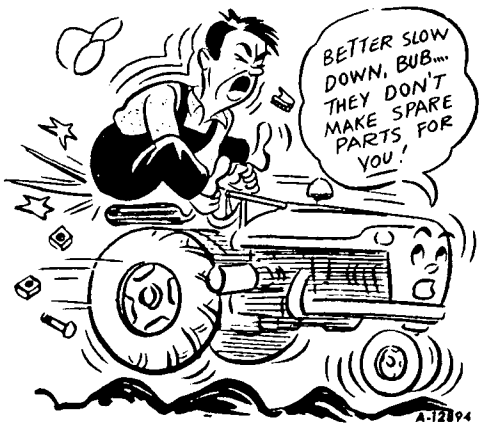
Illust. 14
Shifting gears.

Only one person, the operator, should be permitted to ride on the tractor when it is in operation.

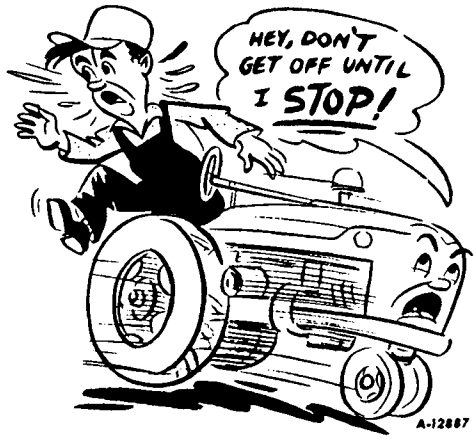
Be extra careful when working on hillsides. Watch out for holes or ditches into which a wheel might drop and overturn the tractor.



Always ride on the tractor seat when driving on the highway or to and from the field. Never ride on the tractor drawbar or on the drawn implement.



Always drive the tractor at speeds slow enough to insure safety, especially when driving over rough ground or near ditches.



Never dismount from the tractor while it is in motion. Wait until it stops.

If the tractor will not move because the rear wheels have dug in or sunk deeply into the ground, don't fasten logs, posts, or anything to the rear wheels that will prevent them from rotating. This would be certain to tip the tractor over backward. Instead. . . . . .

3. Hold the clutch pedal in this position and move the gearshift lever to the desired speed (*Illust. 6*); then advance the engine speed control lever to a position where the engine operates best for the load to be handled.

4. Start the tractor in motion by slowly releasing the clutch pedal. **Note:** Do not shift gears while the engine clutch is engaged or while the tractor is in motion.

5. Do not "ride" the clutch or brake pedals by resting the feet on the pedals while driving the tractor as this will result in excessive wear on the linings.

Always latch the brake pedals together before driving the tractor in high gear. To latch the pedals together, engage the latch into the slot in back of the right pedal. *See Illust. 16.* When the brake pedals are not latched together, the latch should rest in the slot in back of the left brake pedal.

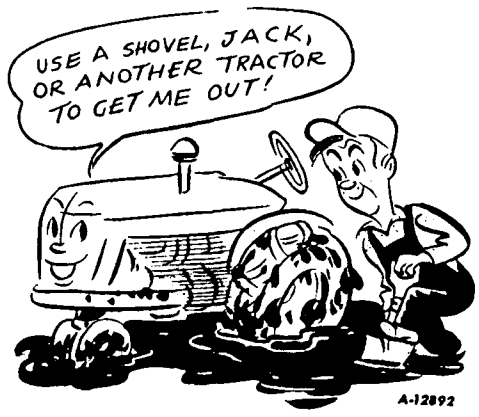
Steering the Tractor

The tractor is steered in the conventional manner by means of the steering wheel; however, to make a sharp or pivot turn, press either the right or left brake pedal, depending on the direction in which the turn is to be made. The brake pedals must be unlatched so they can be operated individually.

Note: The steering wheel can be reversed on the steering shaft, if it is necessary, to provide additional standing room when driving the tractor in a standing position.

To Stop the Tractor

Disengage the clutch by pressing down firmly on the clutch pedal and move the gearshift lever to neutral position. Use the brakes if necessary.



. . . . . .dig out or jack up the rear wheels and fill in under them. Or, if another tractor is available, hitch it with a chain to the front end of the "stuck" tractor. The power of both tractors can be used, if needed, provided a heavy pull is kept on the chain all the time.

Fifth Speed (Safety First)

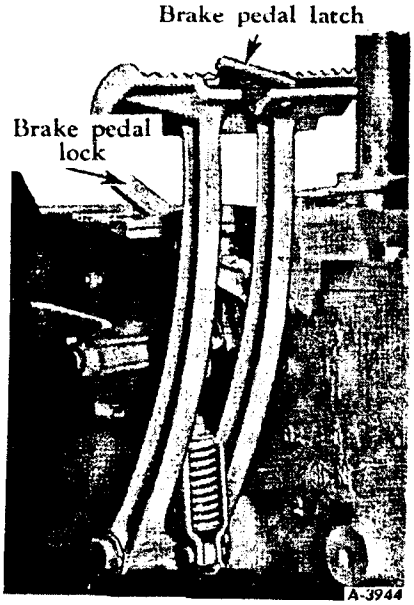
On tractors equipped with steel rear wheels, the (High) 5th speed is locked out by a lockout screw (*Illust. 14*) located on top of the transmission case. Do not remove this screw unless the tractor is converted to pneumatic tires. Then remove the lockout screw and replace it with a $\frac{3}{8} \times \frac{3}{4}$-inch cap screw.

Locking the Brakes

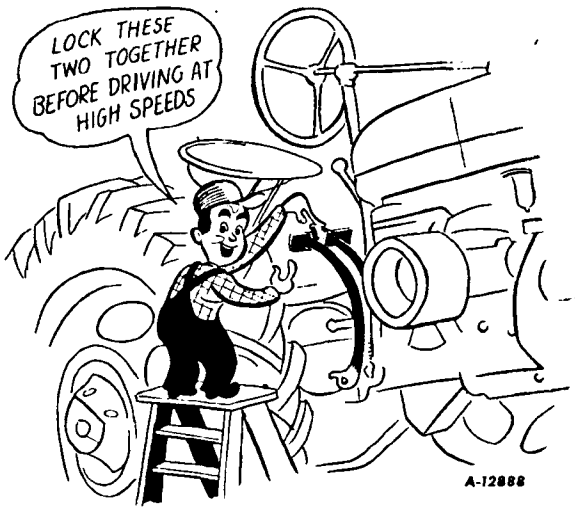
Always lock the brakes when the tractor is parked on a grade or when doing belt work. To lock the brakes, first latch the brake pedals together with the latch as previously described. Then press down on the brake pedals and lift up the brake pedal lock and let it fall forward. *See Illust. 16.* The lock will then engage with the ratchet on the left brake pedal. The brake pedals will lock in this position. To release the brakes, simply press the brake pedals further down, lift the lock and let it fall back into the disengaged position.

Operating the Belt Pulley and Power Take-Off

The belt pulley and power take-off are started and stopped by the same engine clutch as the tractor. Be sure to disengage the engine clutch before moving the power take-off shifter rod.



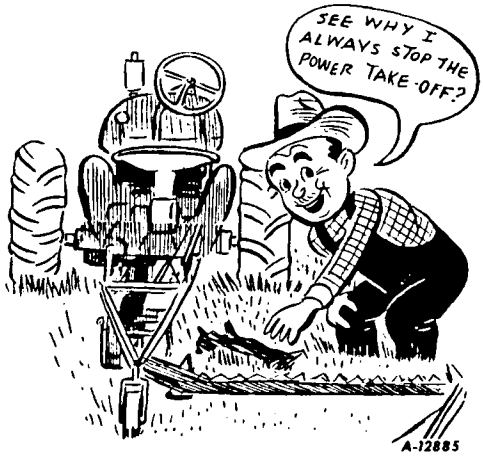
Illust. 16
Locking the brakes.



Always lock the brake pedals together when driving on the highway or when driving in high gear.

Be sure the brakes are properly adjusted.

Always engage the clutch gently, especially when going up a hill or when pulling out of a ditch.



Always stop the power take-off before dismounting from the tractor.

Operating the Power Take-Off with the Tractor Standing Still

1. The transmission gearshift lever must be in neutral position.

2. Move the engine speed control lever back to low idle speed.

3. Depress the clutch pedal to disengage the engine clutch.

4. Pull the power take-off shifter rod up until the shafts are in mesh.

5. Slowly release the clutch pedal.

Operating the Power Take-Off with the Tractor in Motion

Follow the first four steps outlined above, then keeping your foot pressed down on the clutch pedal (in the disengaged position), advance the engine speed control lever and move the transmission gearshift lever to the speed desired to run the tractor. Slowly release the clutch pedal and the tractor will start in motion with the power take-off in operation.

When the power take-off shaft is not in use, always keep it covered with the power take-off shaft guard.

Be sure to stop the power take-off before dismounting from the tractor.

Operating the Belt Pulley

The gearshift lever must be in neutral position when operating the belt pulley.

Disengage the clutch and move the pulley control lever back until the gears are in mesh; then slowly engage the clutch. The belt pulley is started and stopped by the same clutch as the tractor; therefore, be sure to disengage the clutch before moving the pulley control lever.

Additional Information and Precautions

1. The power take-off shaft speed is 537 r.p.m.; the belt pulley speed is 899 r.p.m.; the belt speed with an 11-inch diameter pulley is 2585 feet per minute.

2. When operating the power take-off, be sure that the master shield (*Illust. 89*) covering the power take-off exposed shaft is always in place.

When the power take-off shaft is not in use, it should be covered with the power take-off shaft guard.

3. When the belt pulley is not in use, it can be removed and the exposed shaft covered with the spacer and the pulley shaft guard.

4. If the belt pulley unit is removed for any reason, be sure to have the correct shims in place when reassembling the unit, as the size and number of these shims will change the tooth contact of the gears. See your International Harvester dealer if adjustment for tooth contact becomes necessary.

Note: Static electricity in tractors equipped with pneumatic tires doing belt work: Static electricity generated by belt work can be discharged harmlessly by attaching a chain to the tractor and letting it touch the ground.

For additional belt pulley and power take-off information, *refer to the Special Equipment section.*

Farmall Hydraulic Lift-All System

The Farmall Hydraulic Lift-All system provides hydraulic power for raising, lowering and adjusting the working depth of the various implements used with this tractor. Implements can be regulated and adjusted without stopping work while the tractor is in motion or while standing still.

Hydraulic Lift-All will lift or drop either the right or left sections of an implement independently of the other, as in the case of cultivators, two-way plows, etc. It will lift the implement partially, or all the way up, as desired by the operator.

To Operate the Hydraulic Lift-All System

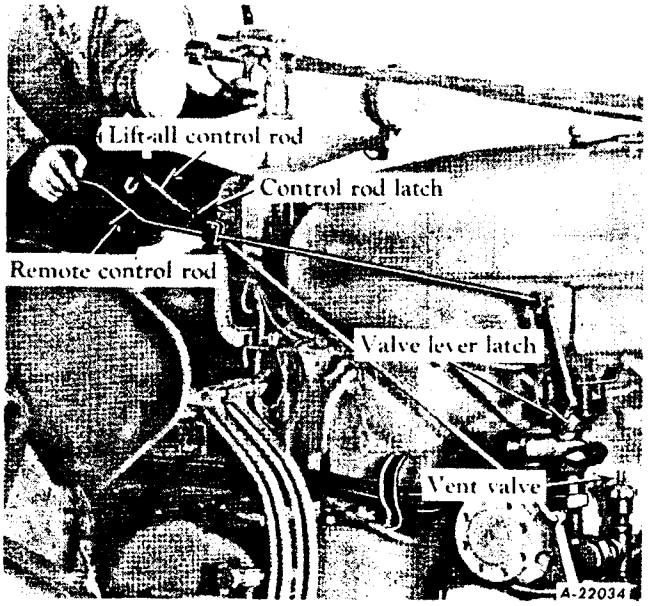
To raise the implement all the way up, lift the control rod (*Illust. 18*) to the top of the slot in the bracket and pull it all the way back toward the operator, hold for an instant, then let go. When the lift is completed, the rod will snap forward until the lug on the bottom comes to rest against the bracket.

To partially raise the implement when it is desirable to ease the load, as when hitching up implements, or in cultivating through wet places, lift the control rod and pull toward the operator slowly, just enough to secure the desired lift.

To lower the implement, lift the control rod and push forward.

If a separate cylinder is used for lifting the rear section of any implement, push the rod forward enough to lower the front section and push it forward further to lower the rear section.

Note: Instructions for connecting the various implements are furnished with the individual implement.



Illust. 18
Operating the Remote Control Attachment

Remote Control Attachment

The Remote Control Attachment is used with the Hydraulic Lift-All system when operating tractor trailing implements.

To Operate the Remote Control Attachment

Pull the Lift-All control rod all the way back and lock it in place with the control rod latch.

Unlatch the control valve lever and close the vent valve (screw down).

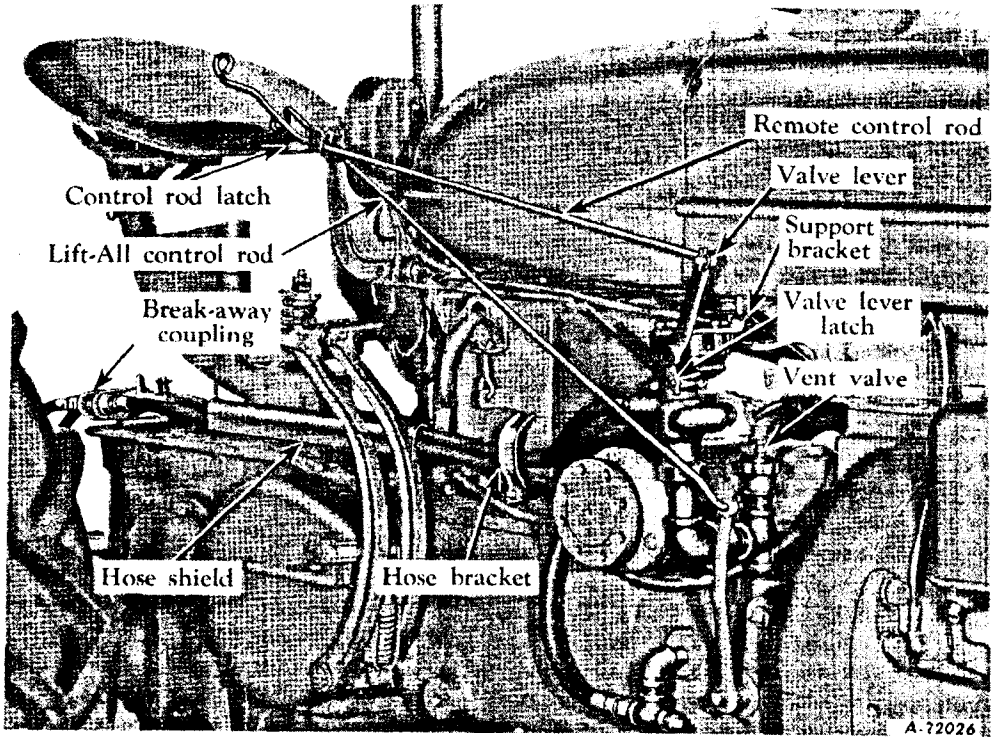
Operate the piston to its maximum stroke in both directions by moving the control rod back and forth about ten times before attaching the cylinder to the implement and adjusting the piston stop collar. This will fill the Remote Control cylinder with oil and remove the air from the system.

Attach the Remote Control cylinder to the trailing implement. Move the control rod backward or forward until the desired working depth is reached. Then set the stop collar on the cylinder piston rod at the position which will allow the implement to reach the desired working depth. The same depth will then be maintained each time the implement is lowered.

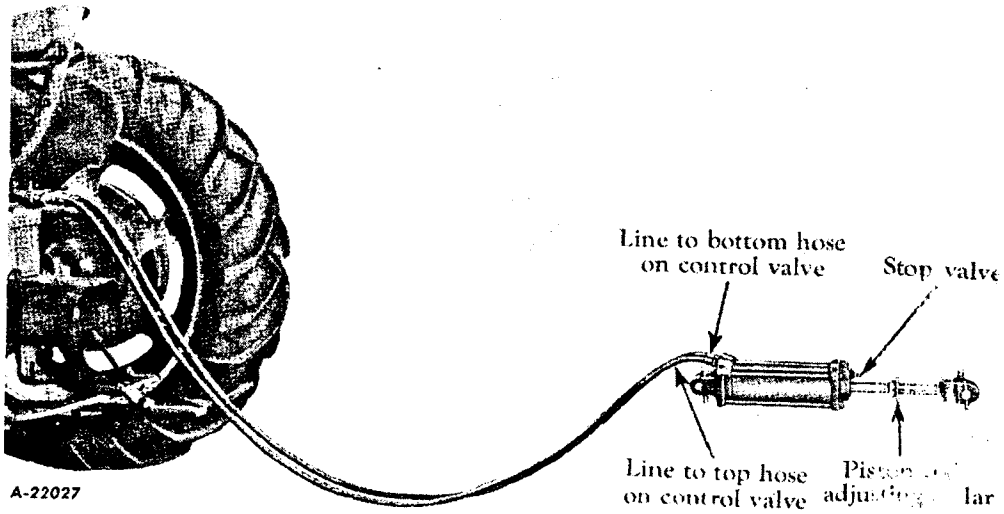
To raise the implement, pull the control valve rod all the way back. To lower the implement, move the control valve rod all the way forward.

Note: Remote Control will operate in this manner if the line from the top hose on the control valve is connected to the Remote Control cylinder on the side with the pivot pin lock pin. It will operate in the reverse manner if the line from the top hose is connected to the opposite side of the cylinder.

Refer to your implement "Owner's Manual" for further operating instructions.



Illust. 19
Remote Control attachment assembled on the tractor.



Illust. 19A
Hydraulic cylinders and hoses.

LUBRICATION

The life of any tractor depends upon the care it is given. Proper lubrication is a very important part of that care.

General Engine Lubrication

The engine has a pressure-feed lubrication system. A gear-type oil pump circulates the lubricating oil under pressure to the crankshaft bearings, connecting rod bearings, camshaft bearings, valve mechanism, timing gears, and governor, thereby assuring positive lubrication of all parts.

The engine is equipped with an oil filter which continually cleans the oil while the engine is running. To obtain the full benefit from the filter, replace the used element with a new one every time the oil is changed in the crankcase (after every 120 hours of operation). Cleaning the old element is not satisfactory.

To pour oil into the engine, remove the cap from the oil filler housing. Test cocks, located on the side of the crankcase pan, indicate the high and low level of the oil. The oil should never be above the high level nor below the low level.

Never check the oil level while the engine is operating.

Oil Pressure Indicator

The oil pressure indicator shows whether sufficient oil is circulating through the engine. Under all operating conditions, the oil pressure of the engine should hold the indicator in the white section. *See Illust. 5A.* If the indicator does not register, stop the engine at once and inspect the oil system to find the cause of failure. If unable to find the cause, consult your International Harvester dealer before operating the engine.

Always check the oil pressure indicator immediately after starting the engine.

Don't oil or grease the tractor while the engine is running.

Oil Pump

The gear-type oil pump in the crankcase has a screen attached to the oil intake to stop large dirt particles from entering the oiling system. This screen should be cleaned whenever the oil pan is removed. The oil intake floats on top of the oil in the crankcase and draws the oil from the surface, thereby eliminating the possibility of mixing water or sediment with the oil.

Crankcase Breather

The crankcase breather, located in the push rod chamber on the right side of the crankcase, has a double copper crimp element. Clean the element after every 250 hours of operation or more often when operating under unusual dust or dirt conditions. Replace with a new element if necessary.

To clean or replace the element, remove the four cap screws holding the push rod chamber side plate to the crankcase and lift out the side plate and breather pipe assembly. Remove the breather baffle and plate in the back of the push rod chamber side plate, remove the element, and clean in kerosene. Reassemble in the reverse order. Be sure the side plate gasket is in place and in good condition.

Oil Filter

The life of your engine depends upon clean oil being circulated to all bearings. Every good tractor operator knows that dirt and other injurious materials eventually get into the crankcase of the engine and that in the normal course of engine operation the lubricating oil undergoes changes which produce sludge, acids, gums, varnish, and other harmful by-products.

The purpose of the oil filter is to separate and remove the dirt and other foreign substances from the oil to prevent these injurious materials from being circulated to the engine. This filter is so efficient it will keep the circulating oil free of harmful materials for 120 hours of operation, at which time the crankcase oil should be changed and the inexpensive filter element replaced. *Refer to pages 29 and 30* for the recommended oil to use for the prevailing temperature. By following the simple, common-sense procedure for keeping dirt and oil impurities away from precision-made engine parts, you will safeguard your tractor engine against undue wear and the operating troubles and upkeep expense which are a natural result of that condition.

Note: To avoid delays, we recommend that you carry extra filter elements on hand so that replacement can be made at the proper time.

To Change the Filter Element

1. Do not change the element while the engine is running.

2. Remove the oil filter base drain plug and allow the oil filter to drain completely.

3. Clean the filter case to prevent dirt from dropping into the base.

4. Unscrew and remove the retaining bolt.

5. Lift up and remove the case.

6. Remove the old element.

Note: If some special equipment on the tractor prevents lifting the case over the element, remove the case and the element together.

7. Wipe out the base and the case with a cloth dampened with kerosene.

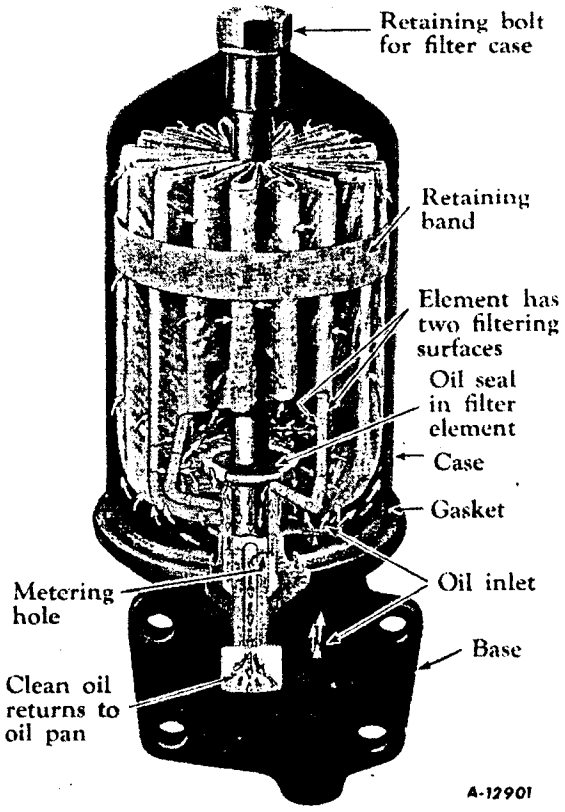
8. Install the new filter element as follows:

(a) Replace the drain plug in the filter base and install the new filter element, leaving the retaining band on the element.

(b) Inspect the small metering hole at the threaded end of the oil filter retainer bolt, and make sure that it is not plugged. A plugged metering hole will impair or stop all oil flow through the oil filter element.

(c) Make sure that the case gasket is in good condition. Then replace the case and retaining bolt, being-careful not to jam the retaining bolt down into the filter seal located inside the filter element. Lower the retaining bolt carefully and screw it through the seal, into the filter base, and tighten securely.

9. Check the oil level in the crankcase to see that the new oil is up to the proper level. *See the "Lubrication Guide."* Now start the engine, check the oil pressure indicator to see whether sufficient oil is circulating through the engine, and inspect the filter for oil leaks.

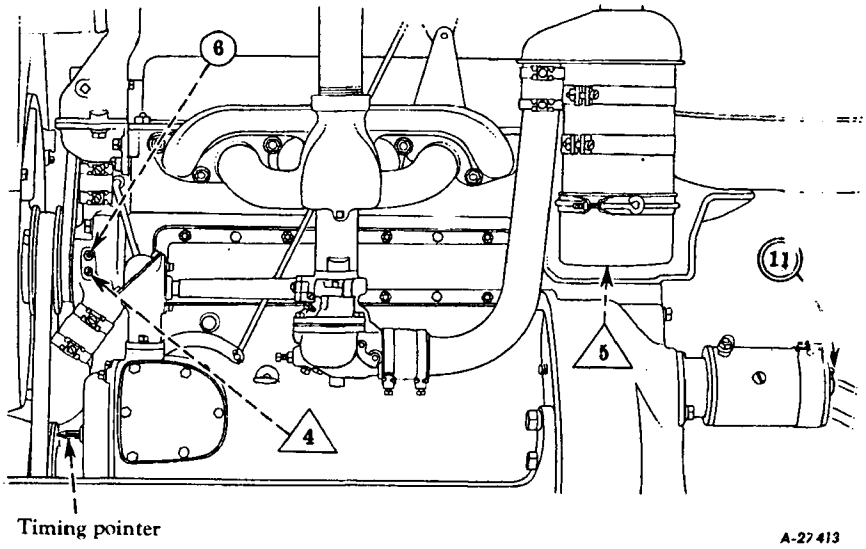


Illust. 21

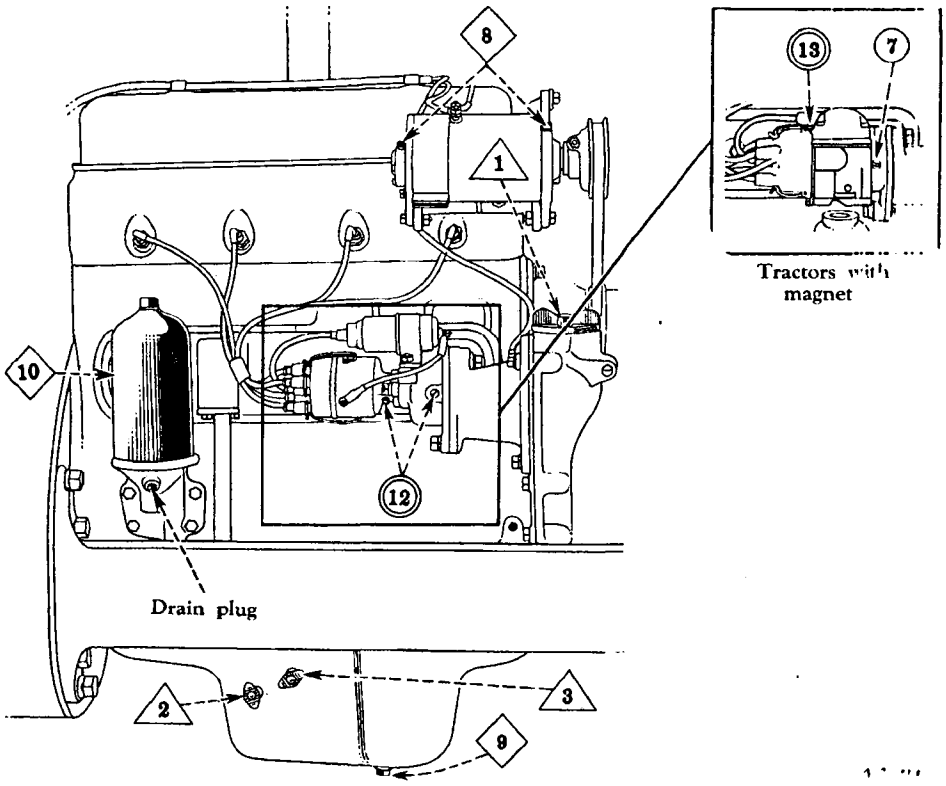
Cutaway view of oil filter showing passage of oil through inside and outside surfaces of the new accordion-pleated filter element

LUBRICATION

Engine Lubrication Guide



Left side of engine.



Right side of engine.

LUBRICATION

Key to Engine Lubrication Guide

The symbols shown around the reference numbers on the lubrication charts on *page 22* indicate the intervals of lubrication.

Paragraph numbers on the left-hand side of the lubrication guide correspond with reference numbers on the lubrication chart.

Detail specifications of the lubricants are listed on *pages 29 and 30.*

△—Daily or After Every 10 Hours of Operation

1—Oil filler.
2—Lower oil level test cock.
3—Upper oil level test cock.

When operating on gasoline: Add sufficient new oil to bring the oil up to the level of the upper test cock (3).

When operating on distillate: Before starting the engine for the day's work, drain the oil down to the lower test cock and add new oil as follows:

Open the lower test cock (2) in the crankcase pan and allow the oil to drain to this level. Close the lower test cock and open the upper cock (3); then add new oil through the crankcase oil filler (1) until the oil appears at the upper cock. Close the cock. Do not check the oil level while the engine is operating or operate the engine if the level of the oil is below the lower test cock.

4—Water pump shaft (capped fitting).

Use pressure-gun grease (chassis lubricant). Apply not over two strokes of the lubricator.

Overlubrication will cause the lubricant to be forced into the cooling system, resulting in the possible clogging of the system.

5—Air cleaner.

Clean and refill the oil cup to the oil level bead with the same new oil as used in the engine crankcase. (Capacity 2¼ U. S. pts.) *Refer to page 38 for further information.*

○—Weekly or After Every 60 Hours of Operation

6—Water pump bearing.

Use pressure-gun grease (chassis lubricant) and apply two strokes of the lubricator.

7—Impulse coupling (tractors with magneto).

Use a light oil such as sewing machine or cream separator oil and oil liberally. Use kerosene when temperature is below 10°F.

◇—After Every 120 Hours of Operation

8—Generator oil cups (2).

Use an oil can and apply eight to ten drops of SAE-20 oil in each cup.

9—Crankcase oil pan drain plug.

Remove the plug (9) and drain all the oil from the crankcase while the engine is warm; then refill with new oil to the level of the upper test cock (3). Crankcase pan capacity is 8 U. S. quarts.

10—Oil filter element.

Remove the drain plug and allow the oil filter to drain completely. Replace the oil filter element at the same time the engine crankcase oil is changed. *Refer to page 21. For the correct lubricating oil to use, refer to specifications listed on page 29.*

◎—Periodic

11—Starting motor.

After every 300 hours of operation, put a few drops of SAE-20 oil in the starting motor oil cup. *Refer to page 49 for further information.*

12—Distributor.

After every 500 hours of operation, remove the grease plugs and insert lubrication fittings. Apply pressure-gun grease (chassis lubricant) to the distributor fitting until a small quantity comes out of the relief hole opposite the plug. Apply several strokes of the grease gun to the drive housing fitting.

Remove the distributor cap and the distributor rotor, and apply one or two drops of light engine oil to the felt in the hole at the end of the breaker cam. *Refer to page 40 for complete information on distributor lubrication.*

13—Magneto distributor bearing (tractors with magneto).

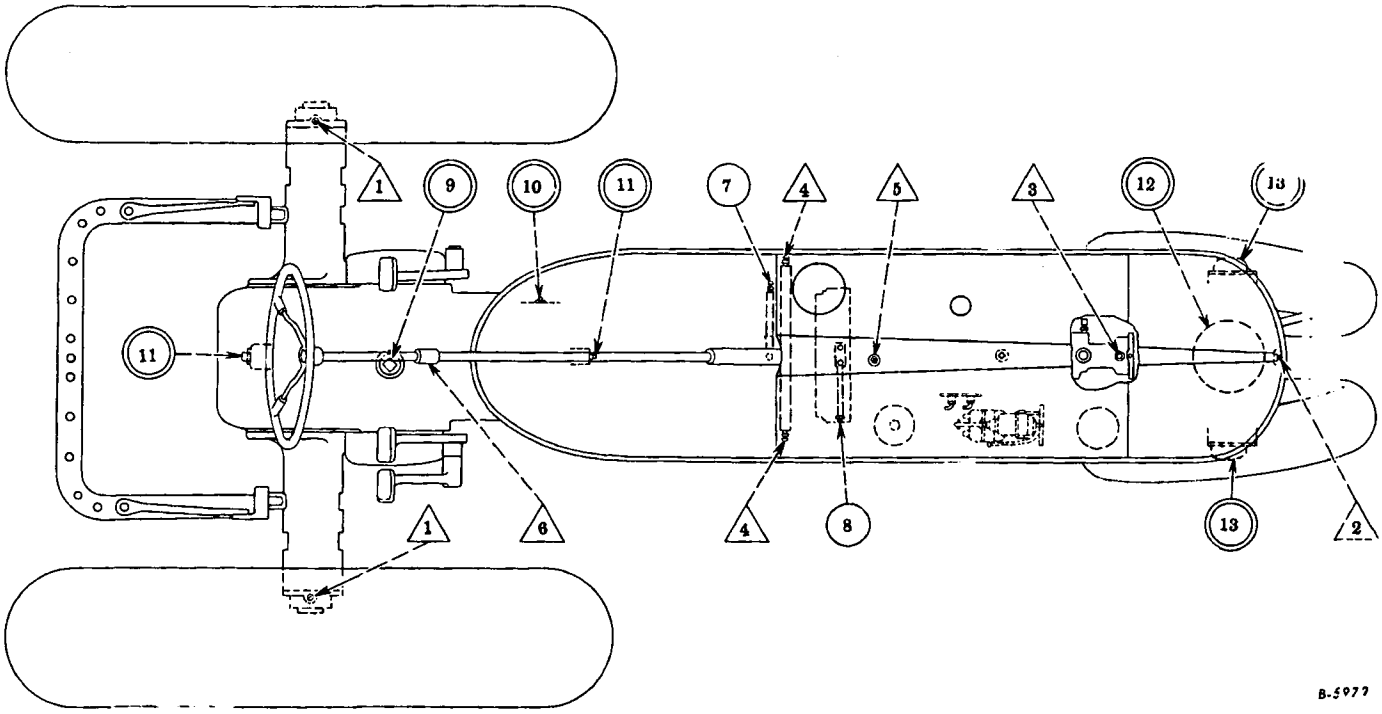
After every 500 hours of operation, fill the distributor bearing oil cup with very light oil such as cream separator or sewing machine oil. *Refer to pages 42 to 44 for complete information on magneto lubrication.*

Miscellaneous parts.

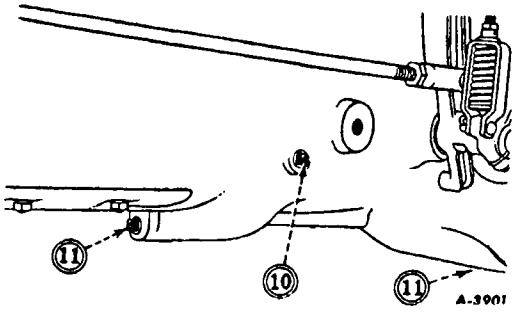
Occasionally lubricate the engine control linkage with a few drops of engine oil.

LUBRICATION

Chassis Lubrication Guide



Top view of tractor.



LUBRICATION

Key to Chassis Lubrication Guide

The symbols shown around the reference numbers on the lubrication charts on *page 24* indicate the intervals of lubrication.

Paragraph numbers on the left-hand side of the lubrication guide correspond with reference numbers on the lubrication chart.

Detail specifications of the lubricants are listed on *pages 29 and 30.*

△—Daily or After Every 10 Hours of Operation

1—Rear axle bearings (2).
2—Upper bolster pivot shaft (1).
3—Starting crank bearing (1).
4—Clutch release shaft (2).
5—Steering shaft bearing, center (1).
6—Steering shaft rear bearing (1).

Use pressure-gun grease (chassis lubricant) and apply two or three strokes of the lubricator, or sufficient grease to flush out the old grease and dirt.

○—Weekly or After Every 60 Hours of Operation

7—Clutch release bearing.

Use pressure-gun grease (chassis lubricant) and apply ten complete strokes of the lubricator. Fitting can be reached through the hole in the left side of the clutch housing by swinging the grease hole cover to one side.

8—Clutch pilot bearing.

Use pressure-gun grease (chassis lubricant) and apply not more than three or four strokes of the lubricator.

To get at the lubrication fitting, turn the crank until the single notch in the fan drive pulley is in line with the pointer on the crankcase cover (see engine lubrication illustrations). Fitting is then in line with the hole in the bottom of the flywheel housing.

◎—Periodic

9—Transmission and differential oil filler plug.
10—Transmission and differential oil level plug.
11—Transmission and differential oil drain plugs.

Use approved lubricant. Keep lubricant up to the level of the plug (10) on the left front side of the transmission case.

Change the oil in the transmission case at least once a year. However, do not drive tractor more than 1,000 hours without changing the oil in the transmission case. If the oil in the transmission case has been thinned with kerosene for operation in temperatures below zero, change the oil before operating in warm weather.

Capacity is 13 U. S. gallons when tractor is standing level.

Note: When operating tractors on belt work with the front of the tractor higher than the rear, it is important that the correct oil level be maintained in the transmission. Keep the oil up to the level plug. Check and add oil when necessary.

12—Steering worm gear.

Use approved lubricant. Lubricant should cover the top of the sector. To check and to add lubricant to the steering gears in the housing of the upper bolster, remove the grille and cover plate. Change the oil at least once a year. However, do not drive the tractor more than 1,000 hours without changing the oil.

13—Front wheels.

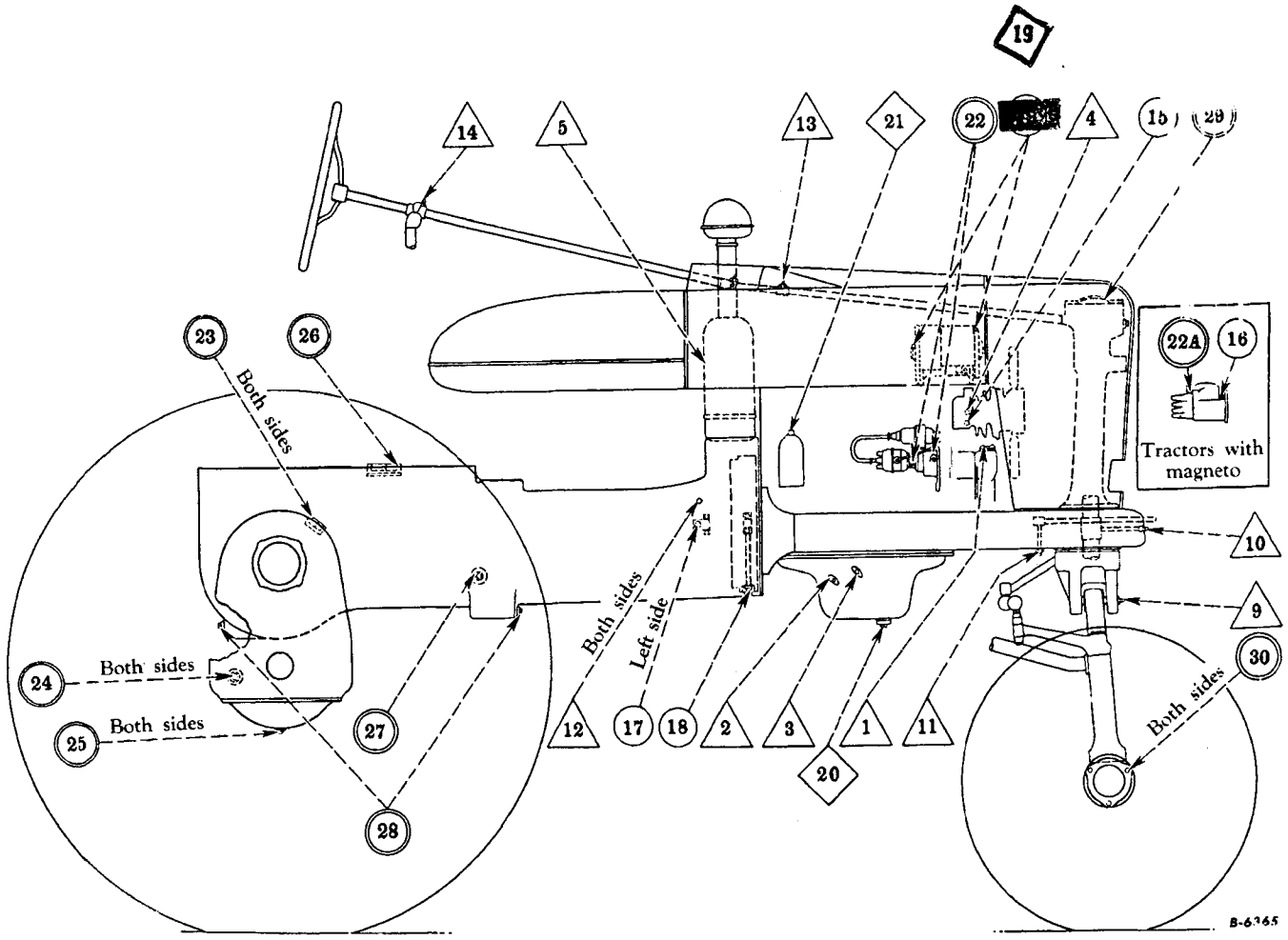
Once every 6 months, remove, clean, and repack the front wheel bearings and grease retainers with pressure-gun grease (chassis lubricant or fiber grease). *Refer to page 30 for further instructions.*

Miscellaneous parts.

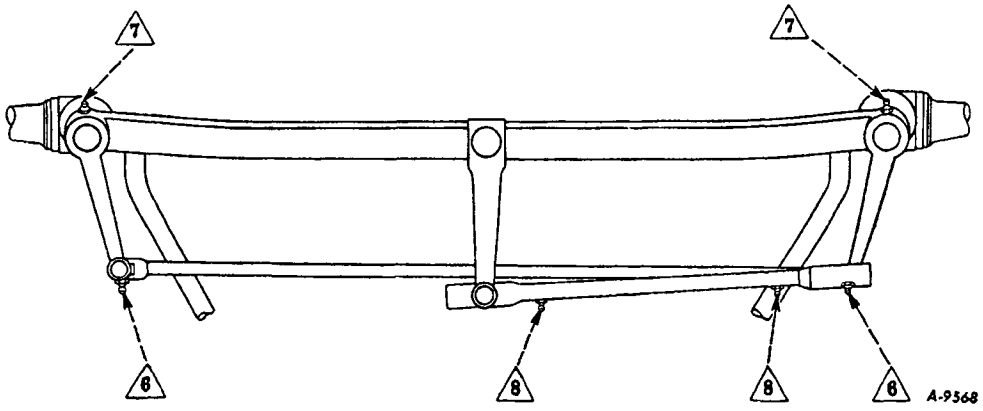
Occasionally, lubricate the clutch and brake pedal connections with a few drops of engine oil.

LUBRICATION

Farmall MV Lubrication Guide



Side view of tractor.



Top view of front axle steering linkage.

LUBRICATION

Key to Farmall MV Lubrication Guide

The symbols shown around the reference numbers on the lubrication charts *on page 26* indicate the intervals of lubrication.

Paragraph numbers on the left-hand side of the lubrication guide correspond with reference numbers on the lubrication chart.

Detail specifications of the lubricants are listed *on pages 29 and 30.*

△—Daily or After Every 10 Hours of Operation

1—Oil filler.
2—Lower oil level test cock.
3—Upper oil level test cock.

When operating on gasoline: Add sufficient new oil to bring the oil up to the level of the upper test cock (3).

When operating on distillate: Before starting the engine for the day's work, drain the oil down to the lower test cock and add new oil as follows:

Open the lower test cock (2) in the crankcase pan and allow the oil to drain to this level. Close the lower test cock and open the upper cock (3); then add new oil through the crankcase oil filler (1) until the oil appears at the upper cock. Close the cock. Do not check the oil level while the engine is operating or operate the engine if the level of the oil is below the lower test cock.

4—Water pump shaft (capped fitting).

Use pressure-gun grease (chassis lubricant). Apply not over two strokes of the lubricator.

Overlubrication will cause the lubricant to be forced into the cooling system, resulting in possible clogging of the system.

5—Air cleaner.

Clean and refill the oil cup to the oil level bead with the same new oil as used in the engine crankcase (capacity 2¼ U. S. pints). *Refer to page 38 for more information.*

6—Steering knuckle arm (2).
7—Steering knuckle pivot (4).
8—Drag link (2).
9—Front axle pivot (1).
10—Upper bolster pivot shaft (1).
11—Starting crank bearing (1).
12—Clutch release shaft (2).
13—Steering shaft bearing, center (1).
14—Steering shaft bearing, rear (1).

Use pressure-gun grease (chassis lubricant) and apply two or three strokes of the lubricator, or sufficient grease to flush out the old grease and dirt.

○—Weekly or After Every 60 Hours of Operation

15—Water pump bearing.

Use pressure-gun grease (chassis lubricant) and apply two strokes of the lubricator.

16—Impulse coupling (tractors with magneto).

Use a light oil such as sewing machine or cream separator oil and oil liberally. Use kerosene when the temperature is below 10°F.

17—Clutch release bearing.

Use pressure-gun grease (chassis lubricant) and apply ten complete strokes of the lubricator. (Fitting can be reached through the hole in the left side of the clutch housing by swinging the grease hole cover to one side.)

18—Clutch pilot bearing.

Use pressure-gun grease (chassis lubricant) and apply not more than three or four strokes of the lubricator.

To get at the grease fitting, turn the crank until the single notch in the fan drive pulley is in line with the pointer on the crankcase cover (see engine lubrication illustrations). Fitting is then in line with the hole in the bottom of the flywheel housing.

LUBRICATION

◇—After Every 120 Hours of Operation

19—Generator oil cups (2). Use an oil can and apply eight to ten drops of SAE-20 oil in each cup.

20—Crankcase oil pan drain plug. Remove the plug (20), drain all the oil from the crankcase while the engine is warm, and refill with new oil to the level of the upper test cock (3). Crankcase pan capacity is 8 U. S. quarts.

21—Oil filter element. Remove the drain plug and allow the oil filter to drain completely. Replace the oil filter element every time the engine crankcase oil is changed. *Refer to page 21.* For the correct lubricating oil to use, refer to specifications listed *on page 29.*

◎—Periodic

Starting motor. After every 300 hours of operation, put a few drops of SAE-20 oil in the starting motor oil cup. *Refer to pages 49 and 54 for further information.*

22—Distributor. After every 500 hours of operation, remove the grease plugs and insert lubrication fittings. Apply pressure-gun grease (chassis lubricant) to the distributor fitting until a small quantity comes out of the relief hole opposite the plug. Apply several strokes of the grease gun to the drive housing fitting.

Remove the distributor cap and the distributor rotor, and apply one or two drops of light engine oil to the felt in the hole at the end of the breaker cam. *Refer to page 40 for complete information on distributor lubrication.*

22A—Magneto distributor bearing (tractors with magneto). After every 500 hours of operation, fill the distributor bearing oil cup with very light oil such as cream separator or sewing machine oil. *Refer to pages 42 to 44 for complete information on magneto lubrication.*

23—Rear axle housing oil filler plugs (2).
24—Rear axle housing oil level plugs (2).
25—Rear axle housing oil drain plugs (2).

Check the oil level periodically and keep the lubricant up to the level of the level plug (24). Use approved lubricant. Change the oil at least once a year. However, do not drive the tractor more than 1,000 hours without changing the oil. Drain and refill to the level of the plug (24). Capacity is 3 U. S. quarts on each side.

26—Transmission and differential oil filler plug.
27—Transmission and differential oil level plug.
28—Transmission and differential oil drain plugs (2).

Use approved lubricant. Keep the lubricant up to the level of the plug (27) on the left front side of the transmission case.

Change the oil in the transmission case at least once a year. However, do not drive the tractor more than 1,000 hours without changing the oil in the transmission case. If the oil in the transmission case has been thinned with kerosene for operation in temperatures below +32° F., change the oil before operating in warm weather. Capacity is 13 U. S. gallons when tractor is standing level.

Note: When operating tractors on belt work with the front of the tractor higher than the rear, it is important that the correct oil level be maintained in the transmission. Keep the oil up to the level plug. Check and add oil when necessary.

29—Steering worm gear. Use approved lubricant. Lubricant should cover the top of the sector. To check and to add lubricant to the steering gears in the housing of the upper bolster, remove the grille and cover plate. Change the oil at least once a year. However, do not drive the tractor more than 1,000 hours without changing the oil.

30—Front wheels. Once every six months, remove, clean, and repack the front wheel bearings and grease retainers with pressure-gun grease (chassis lubricant or fiber grease). *Refer to page 30 for further instructions.*

Miscellaneous parts. Occasionally, lubricate the clutch and brake pedal connections with a few drops of engine oil.

Occasionally, lubricate the engine control linkage with a few drops of engine oil.

Engine and Chassis Lubricant Specifications

Point of Lubrication	Capacity	Anticipated Air Temperature		
		Above +80°F.	+80°F. to +32°F.	Below +32°F.
Engine crankcase	8 qt.	SAE-30	20W	10W
Air cleaner oil cup	2¼ pt.	SAE-30	20W	10W
Battery ignition unit Distributor and drive housing Cam hole felt (in distributor)	....	Chassis lubricant Light engine oil	Chassis lubricant Light engine oil	Chassis lubricant Light engine oil
Magneto (tractors so equipped)	.....	Light oil*	Light oil*	Light oil*
Generator	.....	SAE-20	SAE-20	SAE-20
Starting motor	.....	SAE-20	SAE-20	SAE-20
Transmission and differential case	13 gal.	SAE-90	SAE-90	SAE-80 or SAE-90†
Steering gear compartment	1 pt.	SAE-90	SAE-90	SAE-80 or SAE-90†
Rear axle drive housing (Farmall MV)	3 qt.	SAE-90	SAE-90	SAE-80 or SAE-90†
Grease fittings ††	.....	Chassis lubricant	Chassis lubricant	Chassis lubricant

*Magneto distributor bearing and impulse coupling: Use a very light oil such as cream separator or sewing machine oil for temperatures above +10° F. Use kerosene in the impulse coupling for temperatures below +10° F. Refer to *page 42* for further information.

†*Refer to "Gear Lubricant"* (*page 30*) for cold weather operation.

††Use pressure-gun grease (chassis lubricant) for fittings on which the hand lubricator is applied, for all temperatures.

LUBRICATION

Lubricating Oil and Grease Specifications

Engine Oil

Engine lubricating oil of regular, premium or heavy-duty grade is satisfactory for use in this engine. The oil should be well-refined petroleum oil free from water, fatty oils and acids.

To Aid Starting

To facilitate starting, the selection of crankcase lubricating oils should be based on the lowest anticipated temperature for the day. It is not necessary to change the crankcase oil every time the temperature rises or falls into another temperature range during some part of the 24-hour day. *Also refer to "Cold Weather Precautions" on page 34* for special instructions.

Gear Lubricant

Tractors shipped from the factory to destinations in the United States of America, Canada and Mexico are filled with SAE-90 regular-type gear lubricant in the transmission, differential and steering gear housing (and rear axle housing, if used) from April 1st to October 1st or with SAE-80 from October 1st to April 1st.

If the tractor, as received, contains SAE-80, change to SAE-90 for temperatures of +80° F. or above. If the tractor contains SAE-90, dilute with kerosene for temperatures of +32° F. or lower, as instructed below, or drain and refill with SAE-80.

To dilute SAE-90, pour 2 U. S. gallons of kerosene into the transmission case and ¼ U. S pint of kerosene into the steering gear housing (also 1 U. S. pint of kerosene into each rear axle drive housing on the Farmall MV). Run the tractor until the mixture is thoroughly warm; then drain down to the level plug and replace the plug.

Drain the diluted SAE-90 and replace with fresh SAE-90 regular-type gear lubricant when operating in temperatures above +32° F. Drain the SAE-80 and replace with SAE-90 when operating in temperatures above +80° F.

Use good quality oil, free from solid materials. For your own protection, select only oils and grease of recognized manufacture. Keep your supply of lubricating oil absolutely clean and free from dust. Always use clean containers. Keep the lubricator clean and wipe the dirt from the grease fittings before applying the lubricator.

Lubrication Fitting Grease

Use pressure-gun grease (chassis lubricant) for lubrication fittings on which the hand lubricator is applied. **Important:** Keep your supply of lubricating oil and grease absolutely clean and free from dust. Always use clean containers. Keep the lubricator clean and wipe the dirt from the grease fittings before applying the lubricator.

Greasing the Front Wheels

Removing and Greasing

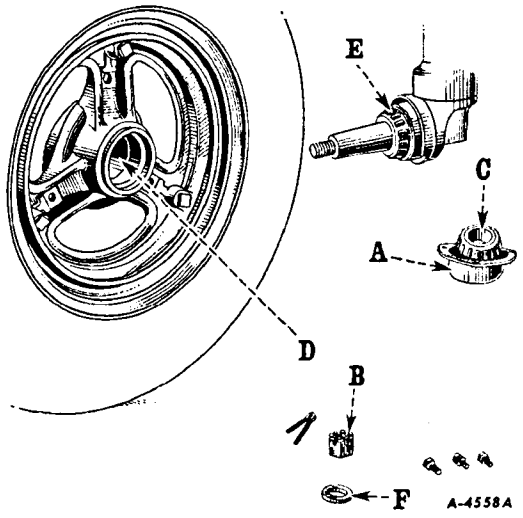
To grease the front wheels, raise the front end of the tractor until the wheels clear the ground. Remove hub cap "A," the cotter pin, nut "B" and washer "F." Remove bearing "C" and place it in hub cap "A" or in a clean container; then remove the wheel. Clean the inside of hub "D," remove the old grease from the bearings and grease retainers, clean them with kerosene, and repack with pressure-gun grease (chassis lubricant). (When temperatures are such that chassis lubricant is too thin to do a satisfactory job, a fibre grease should be used.)

It is advisable to leave bearing "E" on the axle and clean it with a brush and kerosene. Repack the rollers with a new grease before reassembling the bearings.

Inspect the oil seal and felt washer "F" and if they are not in satisfactory condition, replace them with new ones. A dirt deflector is also provided on the axle to prevent dirt from entering at the inner bearing.

Replacing and Adjusting

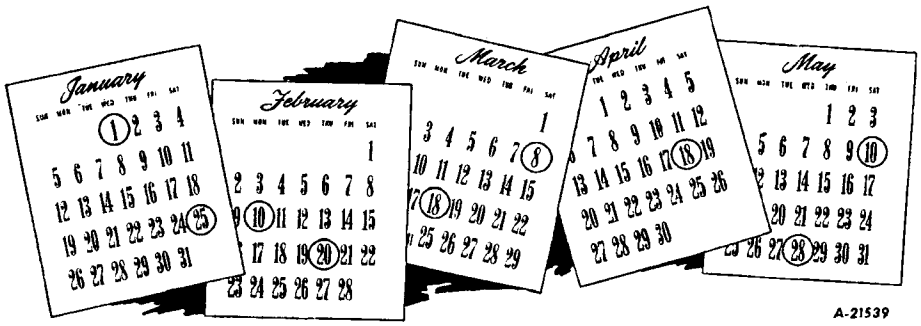
Reassemble the wheel and tighten nut "B" until the wheel binds slightly, rotating the wheel at the same time. Back the nut off one castellation from the cotter pin hole; replace the cotter pin and hub cap. *Be sure to keep all parts clean.*



Illust. 30

Wheel removed for cleaning and greasing.

MAINTENANCE



Periodic Inspections

To keep your tractor performing efficiently, it is advisable to systematically inspect the following points at intervals as outlined below.

After Every 10 Hours of Operation

Air cleaner cap.....Remove dirt or chaff. *See page 38.* (*When unusual dust or dirt conditions are encountered during operation, it may be necessary to service more frequently.*)

Lubrication points.....*See "Lubrication Guide."*

Air cleaner oil cup.....Remove, clean and refill. *See page 38.*

Cooling system.....Check level of coolant in radiator. *See pages 35 and 36.*

After Every 60 Hours of Operation

Air cleaner, complete.....Remove and clean. *See page 38.* (*When unusual dust or dirt conditions are encountered during operation, it may be necessary to service more frequently.*)

Flexible rubber connection between air cleaner and carburetor.....Inspect for loose fit or damage.

Fan belt and generator belt.....Check tension; replace when necessary. *See pages 37 and 48.*

Radiator fins.....Clean spaces. *See page 37.*

Lubrication points.....*See "Lubrication Guide."*

Storage battery.....Check liquid level and specific gravity. *See pages 56 and 57.*

After Every 120 Hours of Operation

Lubricating oil filter.....Replace filter element. *See page 21.*

Engine crankcase.....Drain and change oil.

Lubrication points.....*See "Lubrication Guide."*

After Every 250 Hours of Operation

Fuel strainer and sediment bowl.....Take apart and clean. *See page 32.*

Spark plugs.....Remove and clean; check gaps. *See page 39.*

Magneto breaker points and chamber (tractors with magneto).....Clean chamber and check breaker points and breaker point openings. *See pages 42 to 44.*

Magneto drive chamber and impulse coupling (tractors with magneto).....Check and clean if necessary. *See "Cold Weather Precautions" on page 34.*

Crankcase breather.....Remove, clean in kerosene, and replace. (*When unusual dust or dirt conditions are encountered during operation, it may be necessary to service more frequently.*) *See page 20.*

MAINTENANCE

After Every 400 Hours of Operation

Fuel line screen (at carburetor).....Remove and clean. *See page 32.*
Cooling system.....Clean. *See pages 35 and 36.*
Engine valves.....Check for clearance. *See page 58.*
Clutch pedal.....Check for free movement. *See page 60.*
Brake pedals.....Check for free movement and equalization. *See page 59.*

After Every 500 Hours of Operation

Distributor breaker points and chamber.....Clean chamber and check breaker points and breaker point openings. *See pages 40 and 43.*
Lubrication points.....*See "Lubrication Guide" (Periodic).*

After Every 6 Months

Front wheels.....Clean and repack with new grease. *See page 30.*
Lubrication points (1,000 hours).....*See "Lubrication Guide" (Periodic).*

Fuel Strainer

Cleaning the Fuel Strainer and Sediment Bowl

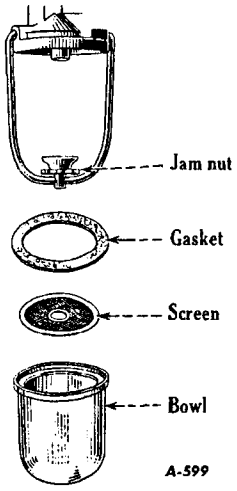
Clean the fuel strainer after every 250 hours of operation. To do this, proceed as follows:

1. Close all shut-off valves.

2. Take the strainer apart by loosening the lower jam nut.

3. Clean the sediment bowl and clean the screen if necessary.

4. When reassembling, be sure the cork gasket between the bowl and the main body is in good condition and does not leak. Use a new gasket if necessary.



Illust. 32
Fuel strainer showing glass bowl removed for cleaning.

Carburetor

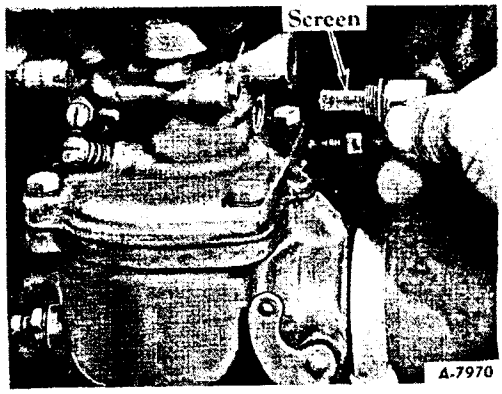
Use clean fuel; the presence of dirt and water will disturb the functioning of the carburetor. Clean the fuel screen after every 400 hours of operation.

The fuel screen can be removed for cleaning by unscrewing the fuel line fitting. Clean the screen and replace it.

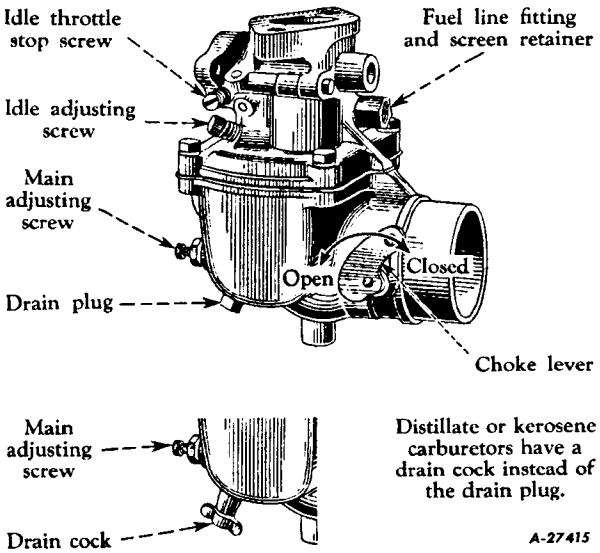
The flange nuts which hold the carburetor to the manifold should be checked periodically for tightness.

Occasionally check the cover screws which fasten the fuel bowl to the fuel bowl cover. They should be kept tight to avoid any air leakage past the fuel bowl cover gasket.

The engine and carburetor are correctly set when shipped from the factory. If this setting has been disturbed for any reason, proceed as follows:



Illust. 32A
Removing the fuel line screen.



Illust. 33
Carburetors for Farmalls M and MV.

Adjusting the Idle Adjusting Screw

Close the idle adjusting screw to its seat by turning to the right (or in), then open one turn. Start the engine and operate it at fast idling speed (without any load) until thoroughly warm. Cover the radiator if necessary or close the radiator shutter if the tractor is so equipped.

While the engine is running at fast idle speed it is advisable to screw in the throttle stop screw a few turns to prevent the engine from stopping when the throttle is closed. Now close the throttle by pushing the engine speed control lever all the way forward. The engine will then be idling at a fairly high speed and the throttle stop screw can be backed out a little at a time until the desired idle speed is obtained. If the engine misses or rolls while backing out the throttle stop screw, the idle adjusting screw may be adjusted either in or out until the engine operates smoothly. Speed up the engine for a few seconds; then recheck the idle adjustment. A slight adjustment in or out will give the smoothest idle.

Tractors with magneto: The engine should not be set to idle so slowly that the impulse coupling will trip continuously.

Main Fuel Adjustment

If your tractor is equipped for distillate or kerosene operation, set the manifold heat control valve in "Hot" position (*Illust. 6B*) and allow the engine to operate on gasoline until thoroughly warmed up. The pointer on the heat indicator should be on the center of the "RUN" section. Now change over to operate on distillate or kerosene and operate the engine a short time before making any adjustments.

To regulate the main fuel adjustment, advance the engine speed control lever to fast idle position (pull rearward to advance), and turn the main fuel adjustment clockwise until the fuel flow is shut off and the speed of the engine drops because of the lean mixture; then open until the engine runs smoothly. After the engine has been put under load, readjust the main fuel adjustment if necessary. Always adjust so that the engine operates smoothly with as lean a mixture as possible.

Recheck the idling speed as described under *"Adjusting the Idle Adjusting Screw."*

If the engine is not receiving the correct mixture of fuel, it may be that the main jet adjusting screw has loosened. If necessary, tighten the adjustment screw packing nut securely.

Removing the Carburetor

1. Shut off the fuel supply at the fuel tank.

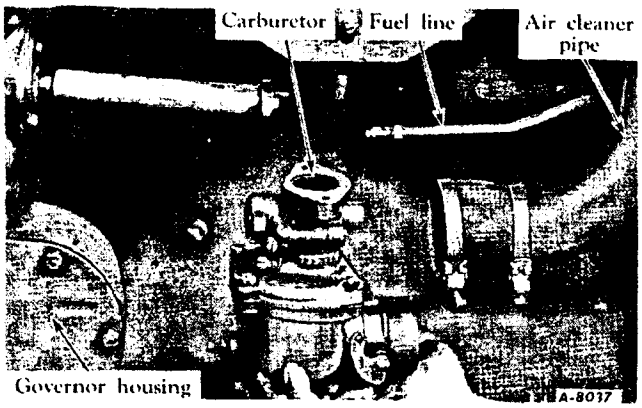
2. Drain the carburetor by removing the drain plug when operating on gasoline, or by opening the drain cock when operating on distillate or kerosene. After the carburetor has drained completely, close the drain cock or replace the drain plug.

3. Disconnect the choke and governor controls.

4. Disconnect the fuel line.

5. Remove the air cleaner connections to the carburetor.

6. Remove the complete carburetor by removing the cap screws or nuts which fasten it to the manifold.



Illust. 33A
Removal of carburetor.

Installing the Carburetor

1. Install the carburetor on the engine in the reverse order of removal.

2. Turn on the gasoline supply.

3. Adjust the carburetor as described previously.

Cold Weather Precautions

When operating the tractor in temperatures of 32° F. or lower, observe the following precautions:

Fuel System

Use only a high-test winter-grade gasoline for starting, and keep your supply in a closed container so the more volatile portion does not evaporate.

Fill the fuel tank at the end of the day's run to prevent moisture from collecting in the tank.

Lubrication

Be sure to use the correct grade of lubricant in the engine crankcase, air cleaner, magneto impulse coupling, transmission, differential and steering gear case as specified *on pages 29 and 30.*

Cooling System

When the temperature is likely to be 32° F. or lower, there is danger of the water freezing in the cooling system.

To prevent this, drain the water from the cooling system at the end of each run or use one of the recommended antifreeze solutions.

To Drain the System

1. Remove the radiator drain pipe cap and the drain plug on the lower left side of the engine. *See Illust. 36.*

2. See that the drain hole is not clogged and that the water drains completely.

Important! Before filling the radiator in freezing weather, close the radiator shutter (if the tractor is so equipped) or cover the entire radiator and start the engine; then fill it with water immediately. This prevents the water from freezing during the warming-up period. For engines using distillate or kerosene, adjust the radiator shutter to maintain the operating temperature of the engine in the center of the "RUN" range on the heat indicator (*Illust. 6A*), or on the low side of the "RUN" range for gasoline fuel.

Magneto Impulse Coupling

(Tractors with Magneto)

For satisfactory starting, it is important to keep the magneto impulse coupling oiled liberally, as specified *on page 23.* Keep the impulse coupling free of dirt and gummy rust formation.

When hand-cranked, the impulse coupling should trip (click) twice for each revolution of the engine; failure to do so may indicate need of cleaning. To clean the magneto, remove it as described *on page 44* and flush the impulse coupling and magneto drive chamber with kerosene.

Antifreeze Solutions

The following table shows the quantity of antifreeze to be added to the cooling system for various temperatures:

Freezing Point (Fahrenheit)	Pints of antifreeze required		
	Ethylene Glycol	Distilled Glycerine	Denatured Alcohol
+10°	12	16	14½
0°	16	19	18
-10°	19	22½	20½
-20°	21½	25½	24
-30°	24	28½	27½
-40°	26	—	31
-50°	28	—	34½
-60°	30	—	37½
-70°	31	—	—

The use of alcohol as an antifreeze is not recommended because denatured alcohol boils at 173° F. However, if it is necessary to use alcohol, check the solution frequently to make certain you have adequate protection for the prevailing temperature.

Note: Use only one type of antifreeze solution. Do not mix solutions, as it will be difficult to determine the exact amount of protection.

Never use any of the following in the cooling water as an antifreeze:

Honey, salt, kerosene, fuel oil, glucose or sugar, calcium chloride, or any alkaline solution.

If an antifreeze solution is to be used, observe the following instructions:

1. Inspect the hose connections. They must be in good condition inside and out. Then tighten all water connections.

2. Inspect the water pump for leaks.

3. Inspect the fan belt and adjust it to the proper tension as described *on page 37.* If the belt is worn or oil soaked it is best to install a new one.

4. Drain and clean the cooling system as described *on pages 35 and 36.*

5. Make sure the radiator drain and the drain on the left side of the engine are tightly closed. Pour the required amount of antifreeze into the cooling system. Fill the radiator with clean water (use soft or rain water if possible) to a level approximately 2¼ inches below the top of the filler neck. Then inspect all hose connections for leaks.

Should the motor overheat, allow the engine to cool off before removing the cap to fill the radiator. When removing the cap, be extremely careful to avoid being scalded by steam which has built up pressure in the radiator.

Cooling System

The cooling system operates under pressure which is controlled by means of a regulating valve built into the radiator cap. Always use clean water (soft or rain water if possible).

Caution: If the water in the cooling system is "hot" and water is to be added, observe the following:

Turn the radiator cap "A" (*see Illust. 35*) slowly counterclockwise to the safety stop to allow the pressure or any steam to escape; then press down on the cap and continue to turn until the cap is free to be removed.

Allow the engine to cool and fill the radiator slowly to approximately 2¼ inches below the top of the filler neck "B." Due to expansion when the system becomes hot any excess water will be discharged through the overflow pipe "D."

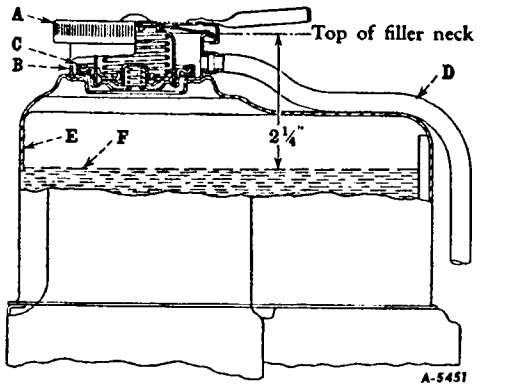
Note: Do not pour cold water into the radiator if the engine is very hot unless conditions make it absolutely necessary, in which case start the engine and let it idle, then slowly pour the water into the radiator.

Before replacing the filler cap, be sure to remove any chaff or dirt particles which may be on the gasket surface or cap, and tighten the cap clockwise to the stop.

Note: A pressure-cooled system will not operate properly unless the cooling system is tight.

The gasket surface must be in good condition. The cap must be properly tightened to the stop, and the system must not have loose connections or leaks. Unless these instructions are followed, pressure will not be maintained, and loss of water and consequent overheating will result. When draining the radiator, always remove the filler cap to permit complete drainage.

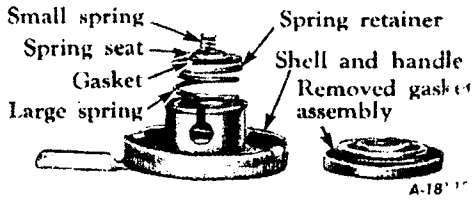
If the filler cap gasket is damaged or badly worn, replace it with a new gasket assembly. To replace a damaged or worn gasket, pry off the old gasket assembly with a small bar or screw driver. When prying off the old gasket assembly, keep one hand cupped over the entire radiator cap assembly in order to prevent the springs and other parts from popping out when the tension is released. When replacing a new gasket assembly, make certain that all of the regulating valve parts are assembled correctly *as shown in Illust. 35A.*



Illust. 35

Water level in pressure-cooled radiator.

"A" Radiator cap.
"B" Filler neck.
"C" Filler cap gasket.
"D" Overflow pipe.
"E" Upper water tank.
"F" Water level.



Illust. 35A

Radiator filler cap.

Then place the new gasket assembly on top of the small spring and press it down with the palm of the hand until it snaps in place.

Do not attempt to repair or replace any of the other regulating valve parts. If the valve is faulty, replace it with a new radiator cap of the same type.

If a heat indicator is to be installed, be sure it has the correct range for the pressure-type radiator.

Thermostat

The water is circulated through the engine block, cylinder head and radiator by a centrifugal pump. Circulation is controlled by a thermostat that prevents the water from flowing through the radiator until the engine has reached operating temperature. With the thermostat closed, water circulates only through the engine block.

To Clean Out Dirt and Sludge

1. Drain the cooling system by removing the plug on the left side of the engine (*Illust. 36*) and remove the cap from the radiator drain pipe. Allow the system to drain, then replace the plug and cap.

2. Fill the cooling system with a solution of three pounds of ordinary washing soda mixed with 6 U. S. gallons of water (cooling system capacity).

3. Leave off the radiator filler cap and operate the engine until the water is hot, then drain and flush with clean water.

To Fill the Cooling System

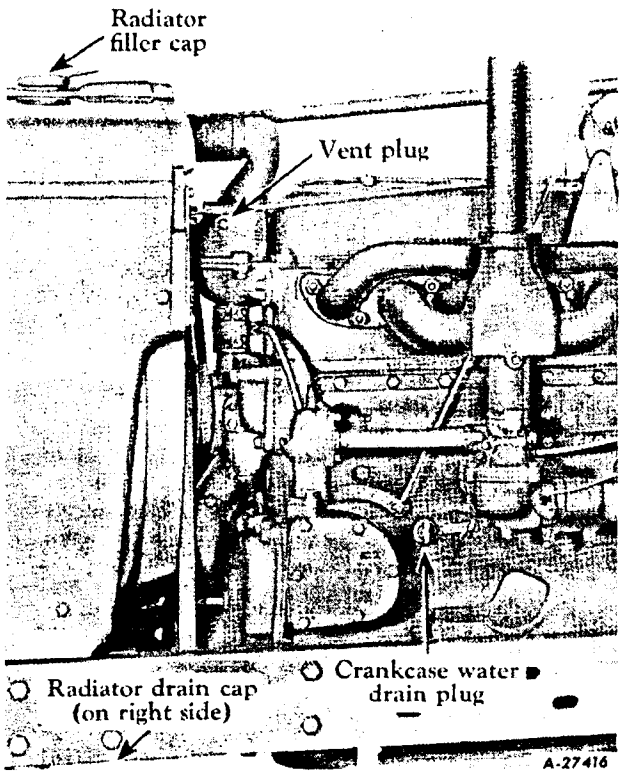
1. The water capacity is approximately 6 U. S. gallons.

2. Replace the plug on the left side of the engine and the cap on the radiator drain pipe.

3. Fill the radiator to a level approximately 2¼ inches below the top of the filler neck. Filling the radiator to this level will allow for expansion of the coolant under normal operating conditions.

Rust Prevention

One of the most common causes of engine overheating is a rust-clogged cooling system. Rust interferes with circulation and cooling, which causes overheating.



Illust. 36

Left side of engine showing drain plugs, vent plug, and filler cap.

In localities where alkaline, acid, or saline waters are the only kind available, the addition of a rust preventive or "inhibitor" will tend to minimize the corrosive action of such water.

For rust prevention during winter use of the engine, a fresh filling of antifreeze containing an effective corrosion preventive should be used. In the spring, drain and discard the old antifreeze solution as the rust preventive or "inhibitor" may be exhausted from contamination and continued use.

After draining the antifreeze, a rust preventive should be added to the cooling water to protect the cooling system during warm weather operations. This inhibitor solution should be drained and discarded in the fall when danger of freezing again makes necessary the use of an antifreeze.

Radiator Core

Overheating is often caused by bent or clogged radiator fins. If the spaces between the radiator fins become clogged, clean them with forced air or water. When straightening bent fins, be careful not to injure the tubes or to break the bond between the fins and the tubes.

Fan Belt Tension

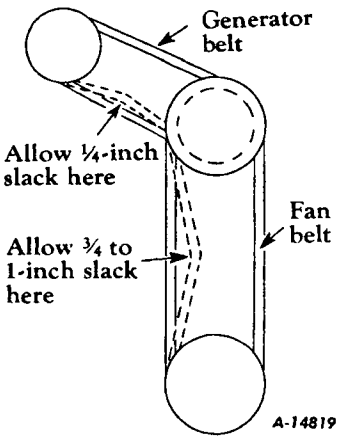
The slack of the fan belt should be checked after every sixty hours of operation to assure maintenance of the correct tension. The tension is correct when the belt can be depressed without effort by your thumb approximately ¾-inch to one inch midway between the two pulleys. *See Illust. 37.* If the slack is more than one inch, adjust the belt as follows:

Adjusting the Fan Belt

The tension of the fan belt is adjusted by changing the width of the groove in the fan pulley. To adjust, loosen the set screw (2) (*Illust. 37A*), then screw the pulley flange (1) in toward belt to tighten the belt, or out to loosen it. Retighten the set screw (2) after the correct tension is obtained.

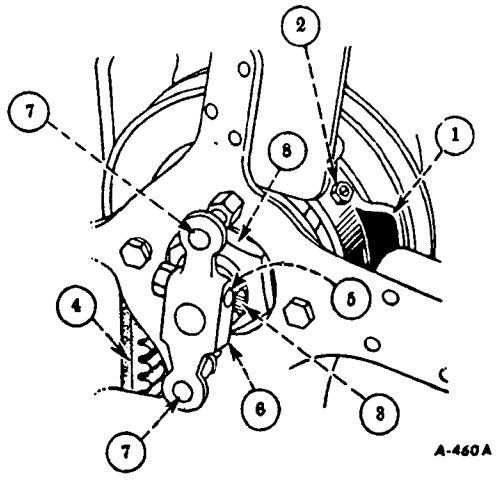
After a new belt has been in use approximately sixty hours, check the tension and adjust again if necessary.

The belt should at no time contact the bottom of the pulley groove as this will cause the belt to wear rapidly. Adjust the pulley for a narrower groove, if this is possible without increasing the tension more than allowable. Having V-belts tighter than the tension specified will result in rapid wear.



Illust. 37

Correct belt tension.



Illust. 37A

Fan belt and water pump packing adjustment.

(1) Fan pulley flange.
(2) Set screw in pulley flange.
(3) Water pump packing nut.
(4) Fan belt.
(5) Driver pin.
(6) Driver.
(7) Stud.
(8) Fan hub nut.

Removing the Fan Belt

To remove the fan belt, loosen the screw (2) (*Illust. 37A*) in the flange on the fan pulley and unscrew the flange as far as possible. Start the belt over the outer flange of the lower pulley and pry it out with a light bar or rod. Slowly crank the engine at the same time and belt will work off pulley. After the belt is off the pulley, move the starting crank ratchet forward and lift the belt out between the pulley and the front bolster. The belt can now be worked over the top of the fan blades.

Replacing the Fan Belt

Replace the fan belt when it becomes soaked with grease, or when it is so badly worn that it does not drive the fan at the proper speed.

When replacing the belt, reverse the procedure outlined under "Removing the Fan Belt," except that the belt can be started on the lower pulley by hand. By slowly cranking the engine, the belt will find the correct position.

Water Pump Packing

The pump may leak due to wear after considerable service. If this occurs, tighten up the packing nut (3) (*Illust. 37A*) just enough to stop the leaking.

To install the new packing, remove the driver pin (5) and driver (6). Unscrew and remove the packing nut (3). Place the water pump packing around the shaft and reassemble the packing nut, driver and driver pin.

Air Cleaning System

Clean air for combustion is assured by an oil-type air cleaner. A heavy screen in the air intake cap prevents large particles from entering the air cleaner. The air then passes to the oil cup, where it goes through a bath of oil. As the air rises to the intake manifold, it passes through a series of oil-bathed screens and the fine dust is removed. As the oil from the screens works back down, it carries the dirt with it and settles in the oil cup. The oil cup must be cleaned and refilled regularly with new oil.

Oil Cup Service

Remove, clean and refill the oil cup every day, or after every 10 hours of operation (more frequently when operating under dusty conditions). Refill the oil cup to the oil level bead with the same grade of oil used in the engine crankcase. The capacity of the oil cup is 2¼ U. S. pints.

Do not remove the oil cup while the engine is operating.

Before replacing the oil cup, clean or wipe the oil or grit from the top bead of the oil cup, the retaining clamp, and the surface under the clamp.

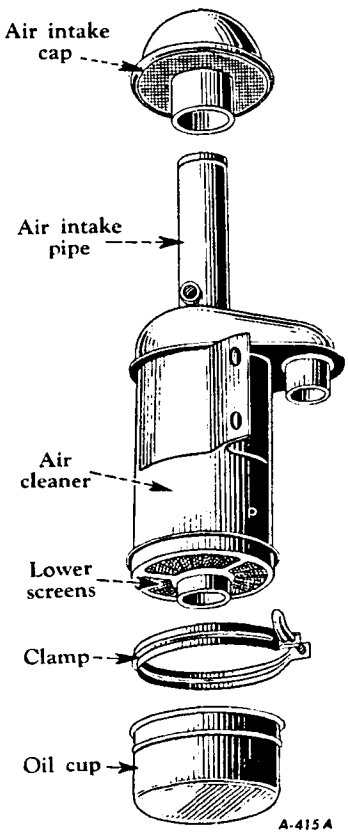
Air Intake Cap and Screen

The screen in the air intake cap prevents chaff and other coarse dirt from getting into the air cleaner. Keep this screen clean and free from all chaff, oil, dust, or paint, as clogged holes in the screen will reduce the power of the engine by restricting the flow of air.

Washing the Air Cleaner

After every sixty hours of operation, particularly if operating the tractor in an atmosphere heavily laden with dust, chaff or lint, remove the entire air cleaner from the tractor, disassemble it (*Illust. 38*) and wash the parts thoroughly in kerosene. Be sure to clean out the air intake pipe.

After all parts have been thoroughly cleaned, replace the air cleaner body on the tractor. Make sure all joints are airtight. Replace the air intake cap. Fill the oil cup to the proper level with the specified grade of oil and replace it on the air cleaner. Be sure it is held securely in place by the cup clamp.



Illust. 38

Exploded view of air cleaner.

General Precautions

As an added precaution against dirt entering the engine, frequently inspect the flexible rubber hose connections between the carburetor and the air cleaner. If they show any sign of deterioration, replace them.

To eliminate strain on the rubber hose connections, be sure the pipes line up.

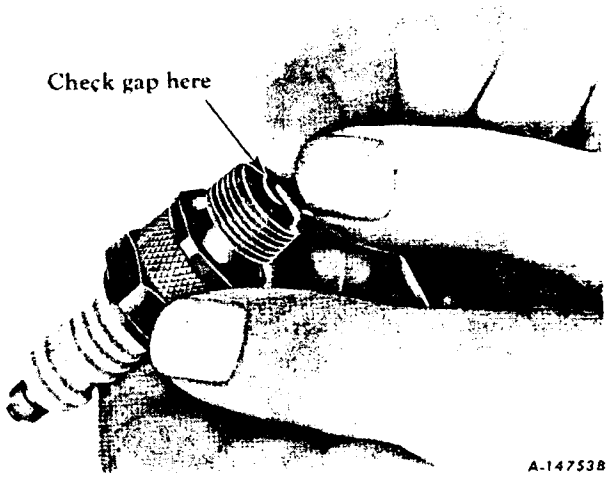
All joints between the air cleaner and carburetor, manifold and the cylinders of the engine should be tight. All gaskets must be in good condition and the bolts should be drawn up tight.

Spark Plugs and Cables

Spark Plugs

Caution: Remove all dirt from the base of the spark plug before removing the spark plug.

Remove the spark plugs after every 200 to 300 hours of operation for cleaning and checking the gaps between the electrodes. A gap of .023 inch should be maintained. When making this adjustment, always bend the outer electrode. Never bend the center electrode as it may damage the insulator. If the gap between the electrodes is too great, due to improper setting or burning of the ends, the engine will misfire and will be hard to start.



Illust. 39

Checking the spark plug gap (set gap .023 inch).

Cleaning the Spark Plugs

Sandblasting is the recommended method for cleaning spark plugs. Never scrape or clean the insulator with anything that will scratch the porcelain. Scratched porcelain allows carbon and dirt to accumulate much faster.

Always use a spark plug wrench when removing or replacing the spark plugs. This helps to prevent cracking the porcelain.

When replacing spark plugs, be sure the gaskets are in good condition and screw the plugs in tight.

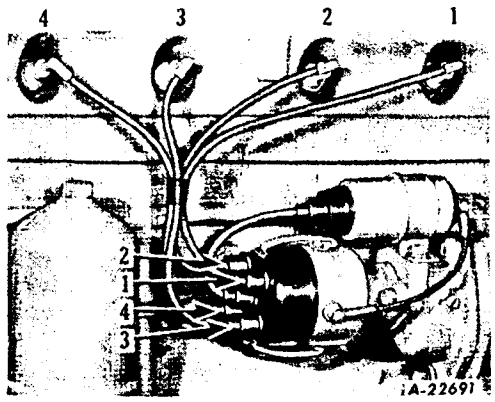
Replace defective plugs with new plugs.

See your International Harvester Dealer for various makes of replacement plugs for normal or special service. These plugs have been tested and recommended as best suited for this engine.

Spark Plug Cables

If the spark plug cables are removed for any reason, note the position of each cable on the distributor or magneto. *Illusts. 39B and 43* show the correct wiring.

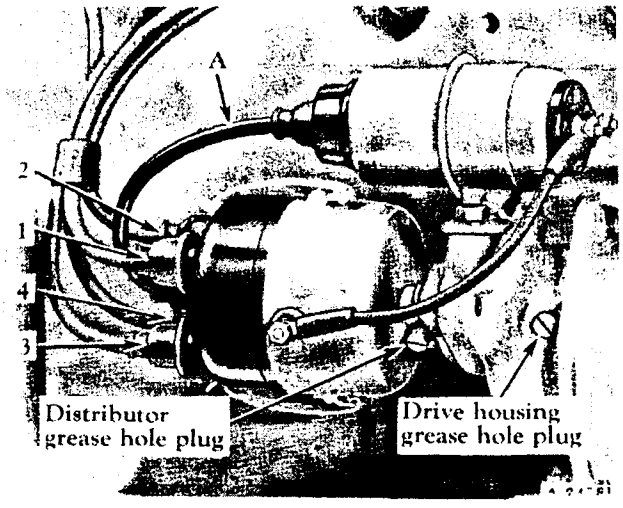
Keep a minimum clearance of ¼-inch between the spark plug cables and the cylinder head. By maintaining this clearance, shorting-out the spark plug will be prevented and the cable will be away from the extreme heat of the cylinder head. If the cable touches the cylinder head, the heat of the engine will soon cause the rubber to become soft, ruining the cable.



Illust. 39A

Spark plug wiring. Engine firing order is 1, 3, 4, 2.

Battery Ignition Unit



Illust. 39B

Distributor wiring and lubrication.

Lubrication

After every 500 hours of operation, remove the grease plugs (*Illust. 39B*) and insert lubrication fittings. Apply pressure-gun grease (chassis lubricant) to the distributor fitting until a small quantity comes out of the relief hole opposite the plug. Apply several strokes of the grease gun to the fitting on the drive housing.

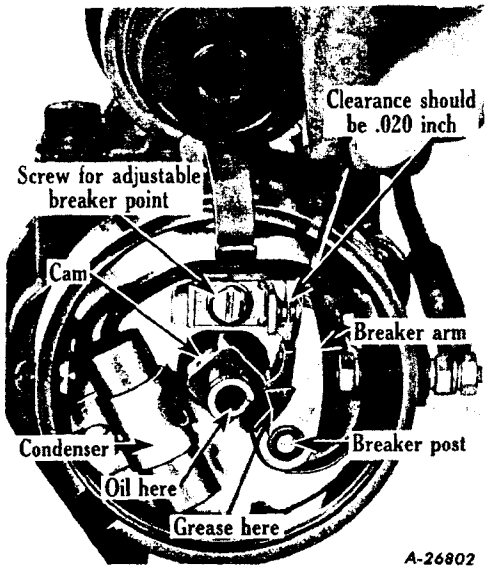
Remove the distributor cap and the distributor rotor and apply one or two drops of light engine oil to the felt in the hole at the end of the breaker cam. *See Illusts. 40 and 40A.*

Greasing the Breaker Mechanism and Checking the Points

It is important that the breaker chamber be kept clean because oil on the breaker points will cause rapid burning. Remove the distributor cap, distributor rotor, and the breaker cover for breaker chamber inspection. *See Illust. 40A.* Care should be taken, when removing the breaker cover, to prevent dirt from entering the breaker chamber. Be sure the chamber is clean and that the breaker points are in good condition and have the proper opening.

Never use emery cloth or sandpaper to clean the points. If the points are worn excessively, replace both points.

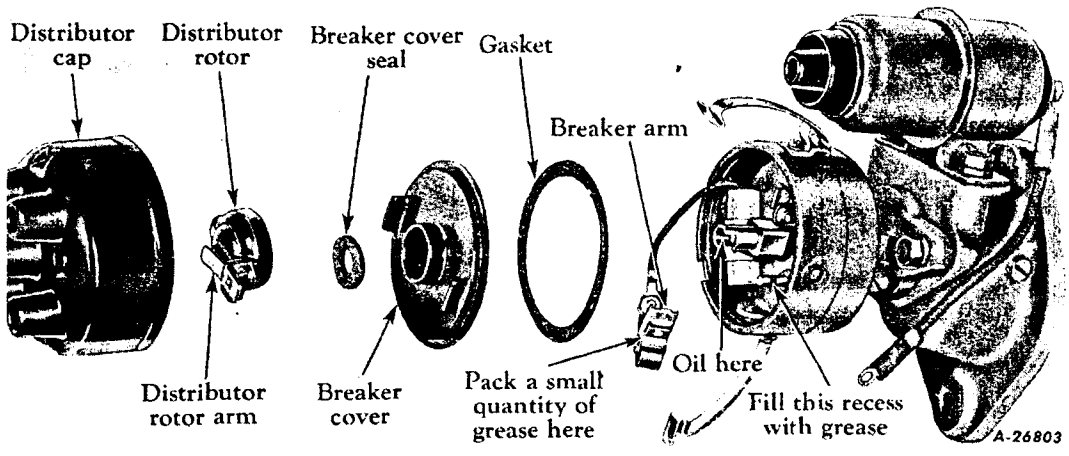
Fill the recess in the breaker post with grease and pack a small quantity of magneto grease in back of the breaker arm rubbing block. *See Illusts. 40 and 40A.* See your International Harvester dealer for the proper grease to use.



Illust. 40

Adjusting the breaker points.

Check the condition of the breaker points for build-up or lip formation. If present, the points must be dressed before the point opening can be checked or set. Check the opening between the breaker points with a feeler gauge as shown *in Illust. 40.* The point opening should be .020 inch when the rubbing block is on the high part of the cam. If the gap is not correct, adjust it by loosening the screw holding the adjustable point. Then move the point toward or away from the point on the breaker arm until the gauge slips snugly into the opening. After the adjustment has been made, tighten the screw.



Illust. 40A

Distributor partially disassembled for servicing.

Distributor Cap

Every three or four months, remove the distributor cap and examine the inside. If any dust, moisture or oil deposits are present, thoroughly clean and wipe dry. To assure long life of the distributor, care must be taken to keep the three small ventilator holes in the distributor cap open at all times. Also see that the distributor rotor is kept clean.

If the terminal nipples are removed, be sure the distributor cap terminals and coil terminal are clean and dry. The distributor is equipped with these nipples to prevent any external electrical leakage when the tractor is operating under adverse conditions.

Ignition Coil

The ignition coil does not require special service other than to keep all terminals and connections clean and tight.

Removing the Battery Ignition Unit

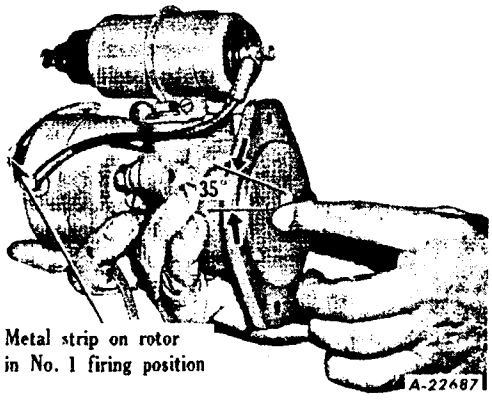
If it is necessary to remove the battery ignition unit for any reason, proceed as follows:

1. Disconnect the ignition switch cable "C" (*Illust. 41A*) from the ignition coil.

2. Pull the secondary cable "A" (*Illust. 41B*) out of the center socket on the distributor cap and remove the cap.

3. Crank the engine slowly until the distributor rotor arm is in the No. 1 firing position. *See Illust. 41A.*

4. Remove the two cap screws and the mounting clip from the distributor drive housing flange and remove the complete unit.



Illust. 41

Adjusting the distributor rotor and drive shaft lugs for timing the distributor.

Illust. 41A

Assembling the battery ignition unit.

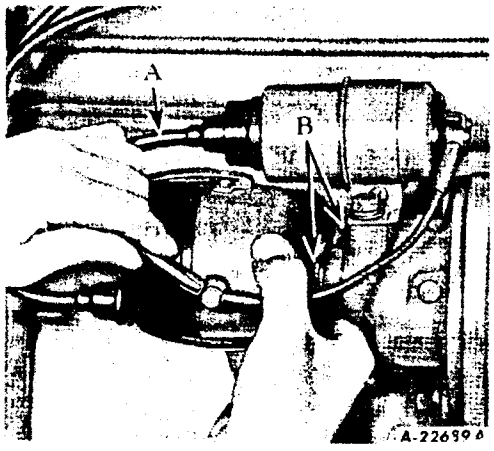
Installing the Battery Ignition Unit

1. Place the battery ignition unit in one hand and, with the fingers of the other hand, turn the drive lugs in a clockwise direction until the rotor arm is approximately in the No. 1 firing position. *See Illust. 41.* Then continue to turn slowly and lightly until a slight resistance is felt.

2. Pull out the drive shaft to disengage the gears, then turn the shaft clockwise so the drive shaft lugs "A" are approximately 35° past horizontal or approximately in the same position as the drive shaft slots "B". *See Illust. 41A.* Engage the gears and press the drive shaft in with the palm of the hand.

3. Assemble the battery ignition unit and gasket and fasten with the mounting bolts and washers, using the mounting clip in front of the lock washer on the top bolt. Assemble the distributor cap.

4. Connect the switch cable "C" (*Illust. 41A*) to the negative (—) terminal on the ignition coil.

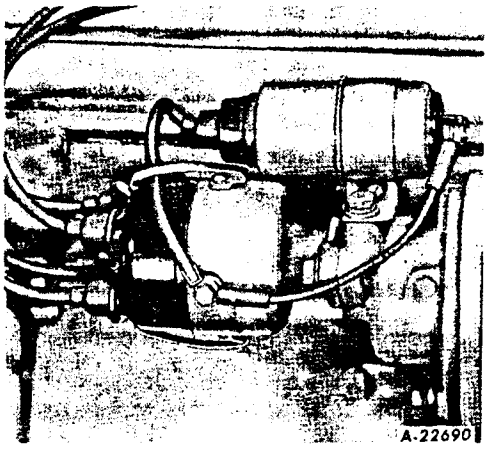


Illust. 41B

Advancing the distributor while holding the secondary cable 1/16" to 1/8" from the primary terminal.

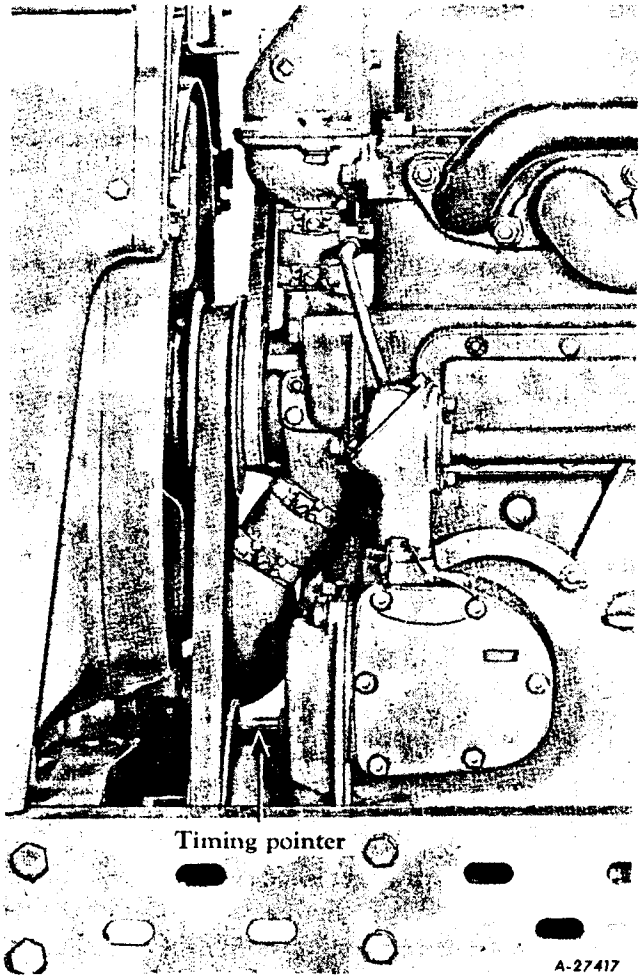
Timing the Distributor to the Engine

Loosen the distributor mounting bolts "B". *See Illust. 41B.* Set the engine on the No. 1 T.D.C. (top dead center) firing stroke by cranking the engine until the No. 1 piston (the piston next to the radiator) is on the upper dead center of the compression stroke. The secondary cable should be assembled properly in the coil terminal. Pull out the knob of the ignition switch and note if the ammeter shows discharge. If the ammeter shows discharge, the points are closed and the retarding of the distributor is not necessary. If the ammeter does not show discharge, retard the distributor by turning the body about 30° in the same direction as the cam rotation. Pull the secondary cable "A" (*Illust. 41B*) out of the center socket on the distributor cap and hold the free end of the cable within 1/16" to 1/8" from the distributor primary terminal, as shown *in Illust. 41B.* Advance the distributor, by turning the distributor body slowly in a direction opposite to the cam rotation, until a spark occurs.



Illust. 42
Showing the secondary cable held under the distributor cap spring for final check of timing.

Place the secondary cable under the distributor cap spring and place the terminal within 1/16" to 1/8" of the distributor primary terminal as shown *in Illust. 42.* Final check should be made by cranking the engine until the first of the double notches on the fan drive pulley is in line with the pointer on the front crankcase cover (*see Illust. 42A*) and continuing until the spark just occurs at the gap between the secondary cable and the primary terminal. The timing marks should just be in line or slightly past (never time before top dead center). If necessary, make the required adjustment to have the spark occur as specified. Retighten the distributor mounting bolts. Assemble the spark plug cables in proper sequence, using the rubber nipples provided. The No. 1 plug is connected to the No. 1 distributor terminal, etc., in the same direction as that of the cam rotation. Assemble the secondary cable in the distributor cap. *See Illust. 39B.*



Illust. 42A
Timing pointer.

Magneto

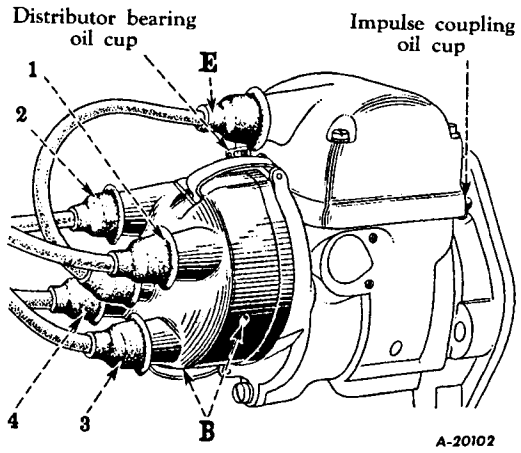
Lubrication

Every week, or after every sixty hours of operation, oil the impulse coupling liberally with a light oil such as cream separator or sewing machine oil. Use kerosene when the temperature is below 10°F.

After every 500 hours of operation, fill the distributor bearing oil cup with very light oil such as cream separator or sewing machine oil. Do not oil oftener as excessive oil might work into the breaker point chamber and cause rapid point wear.

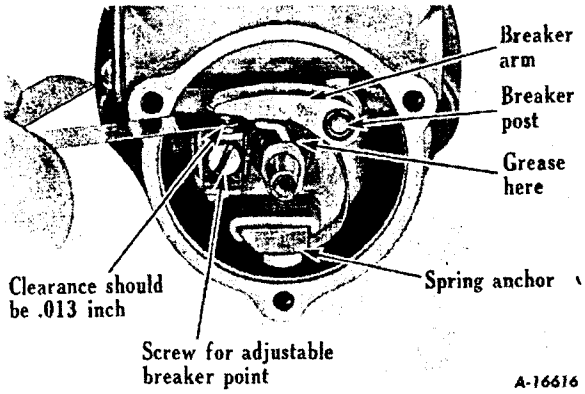
Magneto Impulse Coupling and Magneto Drive Chamber

For satisfactory starting, it is important to keep the magneto impulse coupling oiled liberally as specified on *page 23.* The impulse coupling should be kept free of dirt and gummy rust formation.



Illust. 43

Magneto wiring and lubrication.



Illust. 43A

Adjusting the breaker points.

When hand-cranked, the impulse coupling should trip (click) twice for each revolution of the engine. Failure to do so indicates the need for cleaning or service.

After every 250 hours of operation, check the magneto drive chamber and clean it if necessary.

Remove the magneto as described *on page 44* and flush the impulse coupling and magneto drive chamber with kerosene.

If it is necessary to remove the impulse coupling from the magneto for cleaning or service, we recommend this be done by your International Harvester dealer.

Greasing the Breaker Mechanism and Checking the Points

The magneto requires very little attention other than properly lubricating the oil cups as specified above. It is important, however, to keep the breaker arm chamber clean as oil on the breaker points will cause rapid point wear. Overlubrication of the distributor bearing oil cup (*Illust. 43*) might cause a dirty breaker point chamber. After every 250 hours of operation, inspect the breaker point chamber to see that it is clean. See that the points are in good condition and have the proper opening. If the chamber is clean, no attention is necessary other than checking the opening of the points; but if the chamber is dirty, all parts must be thoroughly cleaned. After cleaning, the points should be dressed, the point opening checked, and the breaker arm greased, as outlined *on this page.*

To reach the breaker mechanism, remove the distributor cap and crank the engine slowly until the metal strip on the distributor rotor points toward the No. 1 terminal on the distributor cap and the impulse coupling just trips. Remove the distributor rotor. Take off the distributor body by removing the three screws "A" (*Illust. 44*). Do not crank the engine while the distributor body is removed or it might be necessary to retime the magneto to the engine.

Remove the breaker arm and anchor from the chamber and clean all parts. Inspect the breaker points and, if necessary, dress them with a sharp fine file. If the points are worn excessively, replace both points.

Fill the recess in the breaker post with grease and pack a small quantity of magneto grease in back of the breaker arm rubbing block. *See Illusts. 43A and 44.* See your International Harvester dealer for the proper grease to use.

Assemble the breaker arm, leaving the spring anchor projecting 1/8 to 3/16-inch above the top of the slot so it is pushed into place by the distributor body. Be sure the points line up when the breaker arm is pushed into place.

Check the opening between the breaker points. *See Illust 43A.* The point opening should be .013-inch when the rubbing block is on the high part of the cam. If the opening is not correct, adjust it by loosening the screw holding the adjustable point (*Illust. 43A*) and moving the point up or down until the gauge slips snugly into the opening. After the proper adjustment has been made, tighten the screw

Line up the distributor rotor key with the keyway in the spindle (*Illust. 44*) and press the rotor loosely on the spindle. With the engine on top dead center of the No. 1 firing stroke, turn the distributor rotor until the metal strip on the rotor points to the No. 1 terminal on the distributor cap. Place the distributor body on the magneto and be sure the rotor shaft enters the "D" shaped hole in the magneto rotor pinion. Remove the distributor rotor to tighten the three screws "A" (*Illust. 44*). Replace the distributor rotor and the distributor cap.

Greasing the Rotor Bearings and the Distributor Gear

After every 2,000 hours of operation or at least every two years, the magneto rotor bearings, distributor gear and distributor gear chamber should be cleaned and repacked with IH magneto grease. We recommend this be done by your International Harvester dealer.

Distributor Cap

Every three or four months, remove the distributor cap and examine the inside. If any dust, moisture or oil deposits are present, thoroughly clean and wipe dry. To assure long life of the distributor, care must be taken to keep the two small ventilator holes "B" (*Illust. 43*) open at all times. Also see that the distributor rotor is kept clean.

If the distributor cap terminal nipples are removed, be sure the terminals and coil cover terminals are clean and dry. The magneto is equipped with these nipples to prevent any external electrical leakage when the tractor is operating under adverse conditions.

Removing the Magneto

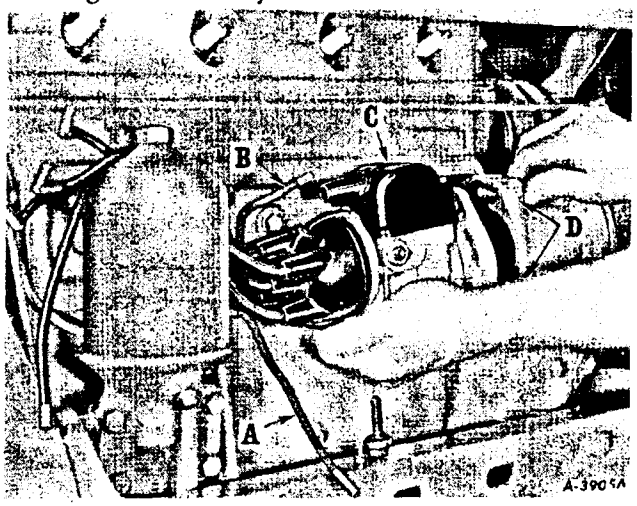
If it is necessary to remove the magneto for any reason, proceed as follows:

1. Disconnect switch cable "A" (*Illust. 44A*) by removing the fillister-head screw and lock washer attaching the cable to the magneto terminal.

2. Pull out cable "B" from coil cover "C" and disconnect all cables from the spark plugs.

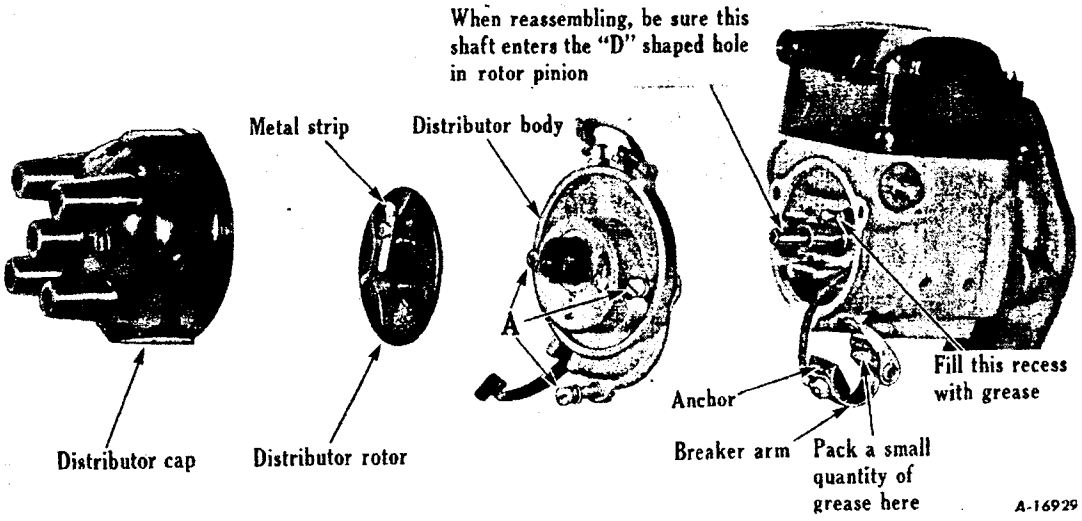
Note: If you prefer to leave the spark plug cables in place, you can remove the distributor cap without disturbing the cables; then remove the magneto assembly *as described in step 3.*

3. Remove the cap screws and lock washers holding the magneto to the bracket at "D" and take off the magneto assembly.



Illust. 44A

Removal of the magneto.



Illust. 44

Magneto disassembled.

Installing and Timing the Magneto to the Engine

1. Pull out cable "E" (*Illust. 43*) from the coil cover end. This will eliminate any possibility of accidental starting.

2. Crank the engine until the No. 1 piston (the piston next to the radiator) is on the upper dead center of the compression stroke. The compression stroke can be determined by removing the No. 1 spark plug, placing your thumb over the opening, and cranking the engine until an outward pressure is felt. Continue cranking slowly until the first of the double notches on the fan drive pulley is in line with the pointer on the front crankcase cover. Both intake and exhaust valves will now be closed.

3. Remove the distributor cap and turn the magneto coupling in a counterclockwise direction (as viewed from the coupling end) until the metal strip on the distributor rotor points toward the No. 1 terminal on the distributor cap. Replace the distributor cap.

4. Assemble the magneto on the engine, making sure that the lugs on the impulse coupling engage in the slots on the magneto drive coupling. (Assemble the magneto so the top is as close to the crankcase as possible.)

5. Insert the magneto mounting bolts loosely in the magneto flange just enough to hold the magneto in place. Crank the engine one complete revolution to the next top dead center. Pull the upper part of the magneto away from the engine until the impulse coupling just trips.

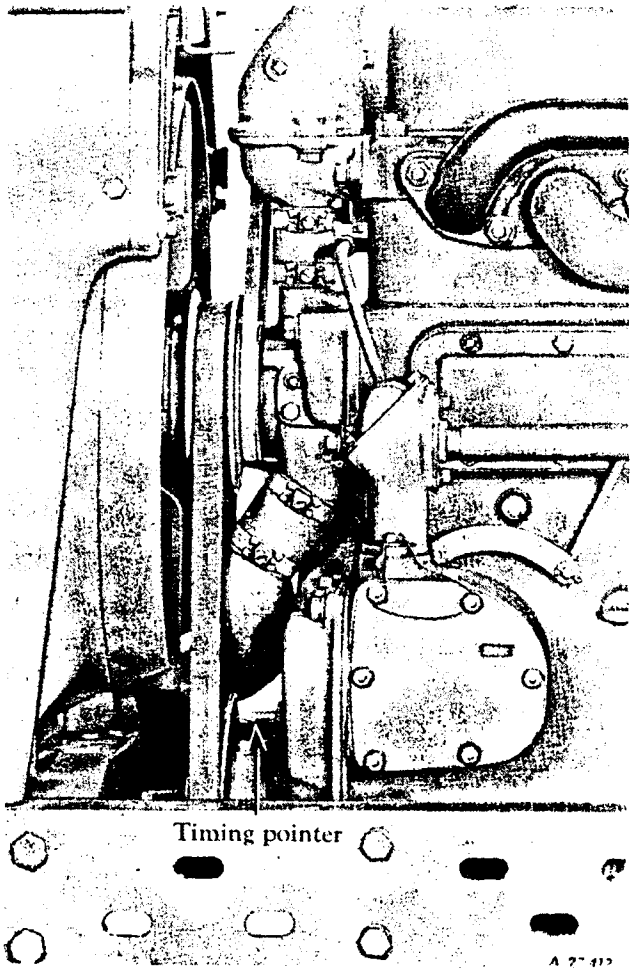
6. Tighten the mounting bolts securely. Attach the spark plug cables to the engine and magneto. Start by connecting the No. 1 cylinder spark plug to the socket marked "1" on the distributor block; connect No. 3 socket with No. 3 cylinder; next with No. 4 cylinder; next with No. 2 cylinder. *See Illusts. 39A and 43.*

7. Connect the switch cable to the magneto terminal.

8. To check the timing, crank the engine slowly until the first notch of the lower fan pulley lines up with the pointer in the front crankcase cover, at which time the impulse coupling should just trip.

9. The magneto is now correctly wired and timed.

10. Push cable "E" back into the socket in the coil cover (*Illust. 43*).

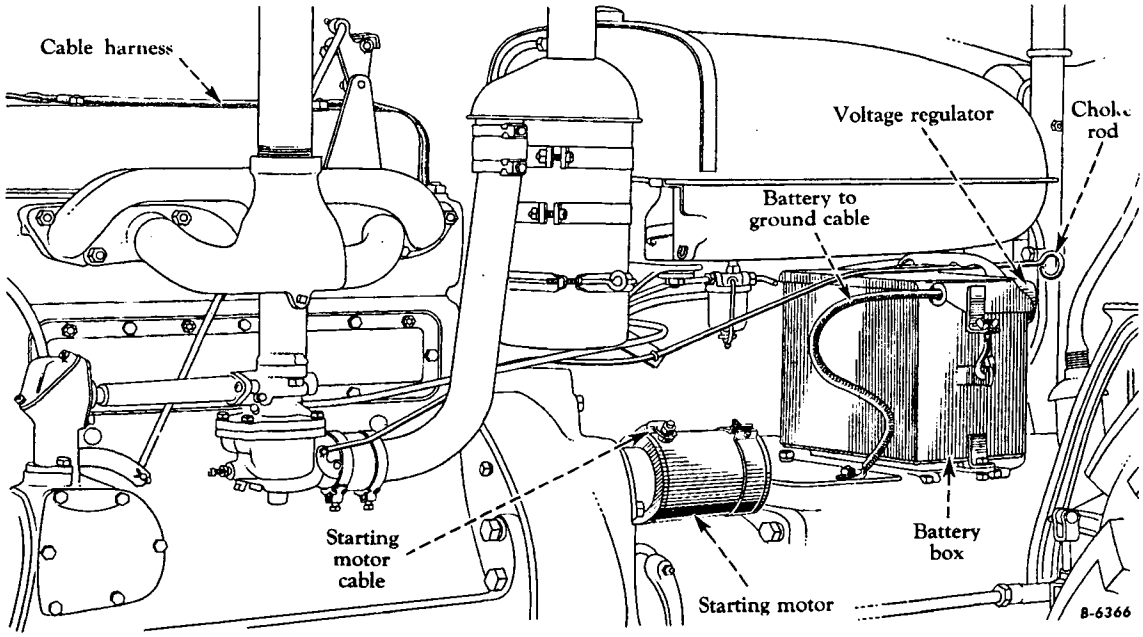


Illust. 45
Timing pointer.

MAINTENANCE

Starting and Lighting Equipment

(Tractors with Battery Ignition and Voltage Regulation)



Illust. 46

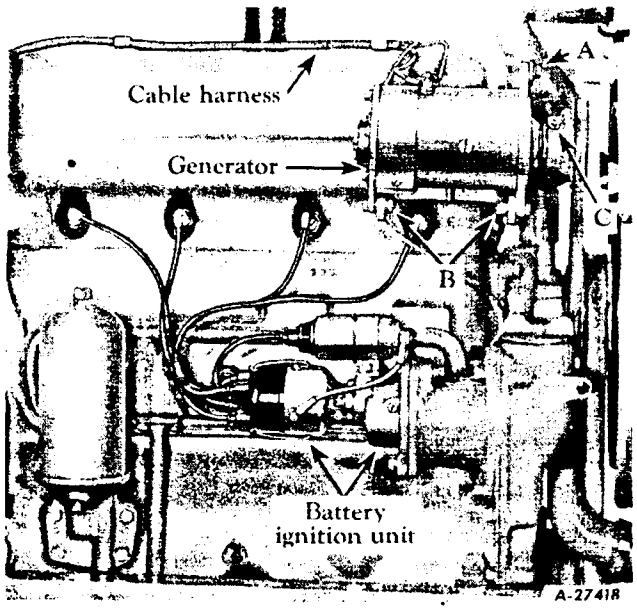
Headlights, starting motor, voltage regulator, cables, etc.

Description

The electrical system of the tractor is a 6-volt type and consists of a generator, voltage regulator, starting motor, lights, light switch and a battery ignition unit with a 6-volt battery. The system is a single-wire type with a ground return to the battery.

Use the illustrations *on pages 46 and 47* and the wiring diagram *on page 50* as a guide for identifying the various electrical units and for tracing the electrical cables and connections. Be sure all terminals are clean and securely fastened.

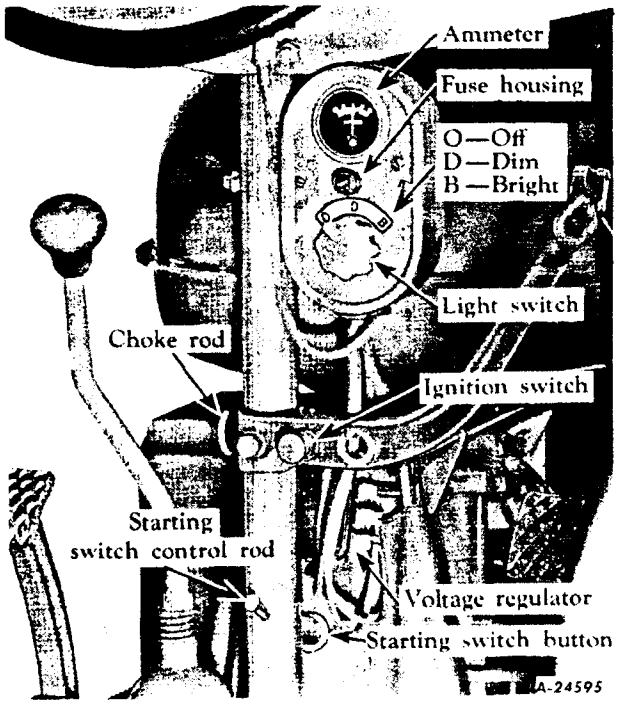
When the electrical equipment is installed at the factory, the battery ground cable is disconnected and taped. Before attempting to start the tractor, make certain that the ground cable is connected.



Illust. 46A

Generator, battery ignition unit, cables, etc.

Light Switch



Illust. 47

Light switch, ignition switch, ammeter, etc.

The light switch has three positions; "O"—off position, "D"—dim lights, and "B"—bright lights.

The Fuse

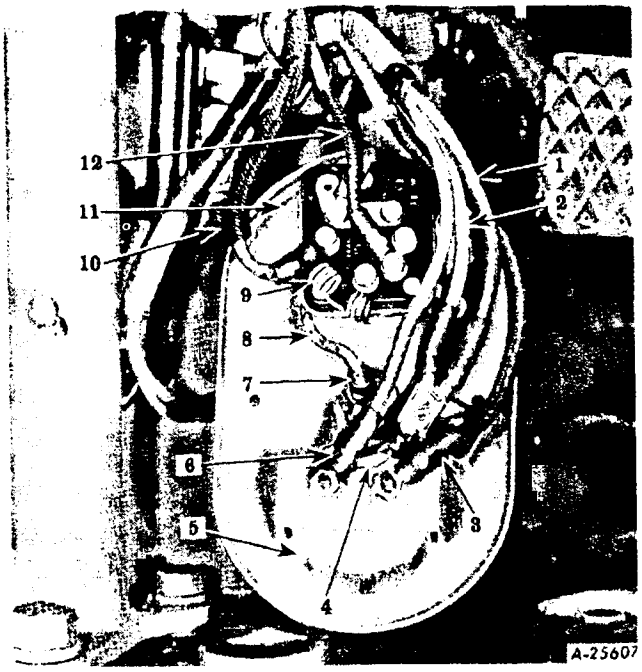
A cartridge type SFE-20 fuse is located in the fuse housing between the light switch and the ammeter. If a short circuit occurs in the lighting circuit the fuse will burn out and break the circuit, preventing damage to the electrical system.

It is important to use the same capacity fuse for replacement. If the lights fail, check the fuse. If the fuse continually burns out, check the electrical wiring for short circuits.

To install a new fuse, unscrew the fuse housing on the instrument panel (*Illust. 47*), pull out the old fuse and replace it with a new one.

Lamps

Tractor lights require 6-8 volt, 32-candlepower single-contact type lamps (No. 142309—Trade No. 1133).



Illust. 47A

Back of instrument panel showing light switch, ignition switch, ammeter, cables, etc.

Index to reference numbers shown in Illustration 47A.

Ref. No.	Description
1	Regulator "L" terminal to junction block cable (natural with green cross tracers).
2	Ignition switch to junction block cable (natural with black cross tracers).
3	Starting switch to ammeter cable.
4	Fuse housing to junction block cable.
5	Ammeter.
6	Regulator "BAT" terminal to ammeter cable (natural with red and black cross tracers).
7	Fuse housing.
8	Fuse housing to light switch.
9	Dimmer coil.
10	Headlight cable harness.
11	Light switch.
12	Light switch to rear light cable.

Generator and Regulator

The generator supplies current to keep the battery in a charged condition, replacing the energy consumed by the starting motor and lights. The generator on your tractor is sealed to prevent the entrance of dirt and moisture. It is hinge-mounted on the right side of the engine crankcase and is driven by a V-belt from the fan pulley. The generator, as received from the factory, has a fixed third brush which is set to give the maximum generator output.

The generator charging rate is controlled by a voltage regulator which controls the generator output, thereby maintaining a satisfactory charging rate, and prevents the battery from overcharging under varying temperatures and operating conditions. It should not require adjustment or attention. If the regulator fails to operate correctly, replace it with a new one or see your International Harvester Dealer.

Caution: Do not at any time place a jumper lead between or accidentally bridge the battery terminal and the field terminal on the regulator. Serious damage to the regulator may result.

Polarizing the Generator

If the generator or the regulator has been removed or the leads disconnected, the generator should be repolarized. After the leads have been reconnected, but before the engine is started, proceed as follows:

After making certain that the grounded battery terminal is the positive (+) one, momentarily connect a jumper lead between the "BAT" terminal of the regulator and the "A" terminal of the generator. This allows a momentary surge of current to flow through the generator which correctly polarizes it. Reversed polarity may result in vibration, arcing and burning of the relay contact points.

Important! Do not touch the jumper lead to the "F" terminal on the generator as this will damage the regulator.

Generator Belt Tension

Check the slack of the generator belt to assure maintenance of the correct tension. The belt should never be loose enough to allow slippage but should not be so tight as to cause excessive side-thrust on the generator bearing. Allow approximately ¼-inch slack. *See Illust. 37.*

Adjusting the Generator Belt

The generator belt tension is adjusted by loosening the set screw "C" in the generator pulley flange (*Illust. 46A*) and turning the flange to obtain a wider or narrower pulley groove. Tighten the set screw after the tension is taken up. (Tension is correct when the belt can be depressed without effort by the thumb, approximately ¼-inch between the two pulleys.) *See Illust. 37.*

Removing the Generator Belt

Remove the generator brace bolt "A" and loosen the generator mounting bolts "B." *See Illust. 46A.* Then move the generator in toward the engine and remove the belt from the generator pulley.

Remove the fan belt by loosening the lock nut and set screw in the flange on the fan pulley. *See Ref. No. 2, Illust. 37A.* Then unscrew the flange as far as possible. Start the belt over the outer flange of the lower pulley and pry it out with a light bar or rod. At the same time, slowly hand crank the engine and the belt will work off the pulley. Slip the generator belt through the fan belt and over the fan.

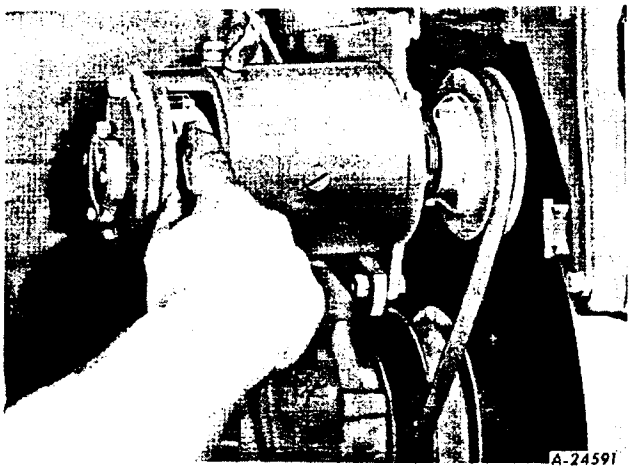
Replacing the Generator Belt

Replace the generator belt when it becomes soaked with grease or badly worn.

When replacing the belt, reverse the procedure outlined *under "Removing the Generator Belt."* Adjust the fan belt and generator belt as described *on pages 37 and 48.*

Cleaning the Generator Commutator

If the commutator is dirty or slightly grooved, it can be polished by placing a piece of No. 00 sandpaper on the commutator while the armature is slowly revolving. *See Illust. 49. Never use emery or carborundum cloth.* Blow all dust from the commutator after the polishing operation is finished.



Illust. 49
Cleaning the generator commutator.

If the commutator is badly worn, rough or out-of-round, it is advisable to take the unit to your International Harvester dealer and have the commutator reconditioned.

Generator Lubrication

Follow the lubricating instructions for the generator as outlined *in the "Lubrication Guide."* Do not lubricate excessively since excessive oiling may cause the oil and grease to gum on the commutator, and will result in a reduction of the generator output and increased commutator and brush wear.

Never oil the commutator and do not lubricate the generator while it is in operation.

Starting Motor

The starting motor is mounted on the left side of the clutch housing.

At regular intervals, remove the starting motor cover band and inspect the commutator.

To clean the commutator, pull out the cable from the center socket on the distributor cap. Remove the starting motor cover band. Depress the starter switch button and, with the starting motor operating, insert a piece of No. 00 sandpaper over the commutator to clean off dirt and discoloration. *Never use emery or carborundum cloth.* Always blow all dust from the commutator compartment after cleaning.

Starting Motor Lubrication

After every 300 hours of operation, put a few drops of SAE-20 oil in the starting motor oil cup. Also put a few drops of SAE-20 oil on the bushing at the drive end whenever the motor is removed for service.

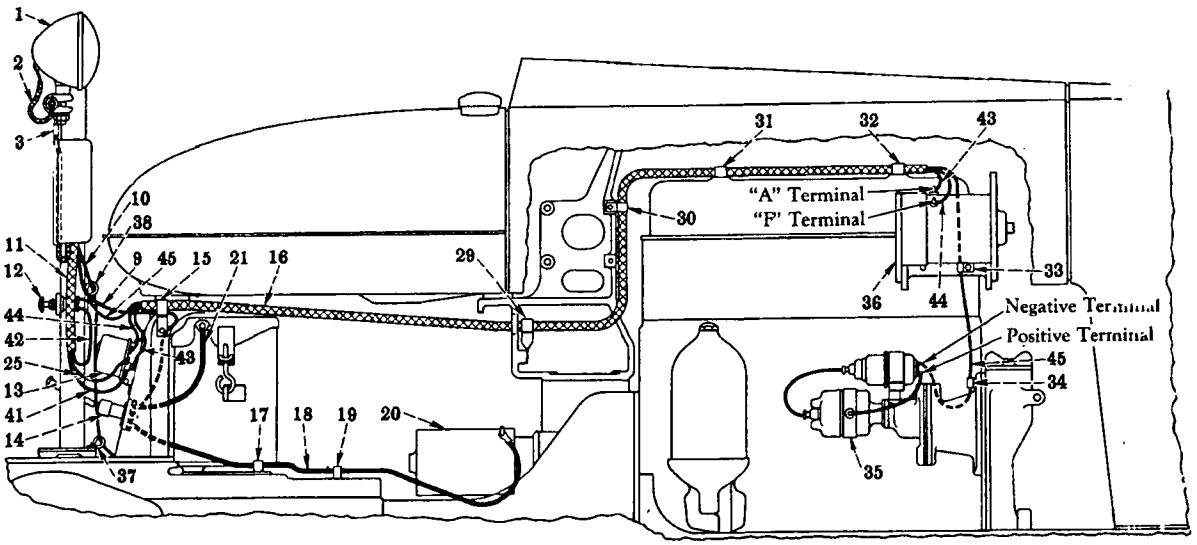
Removing the Starting Motor

1. Disconnect the ground cable from the battery.

2. Remove the cable from the terminal on the starting motor.

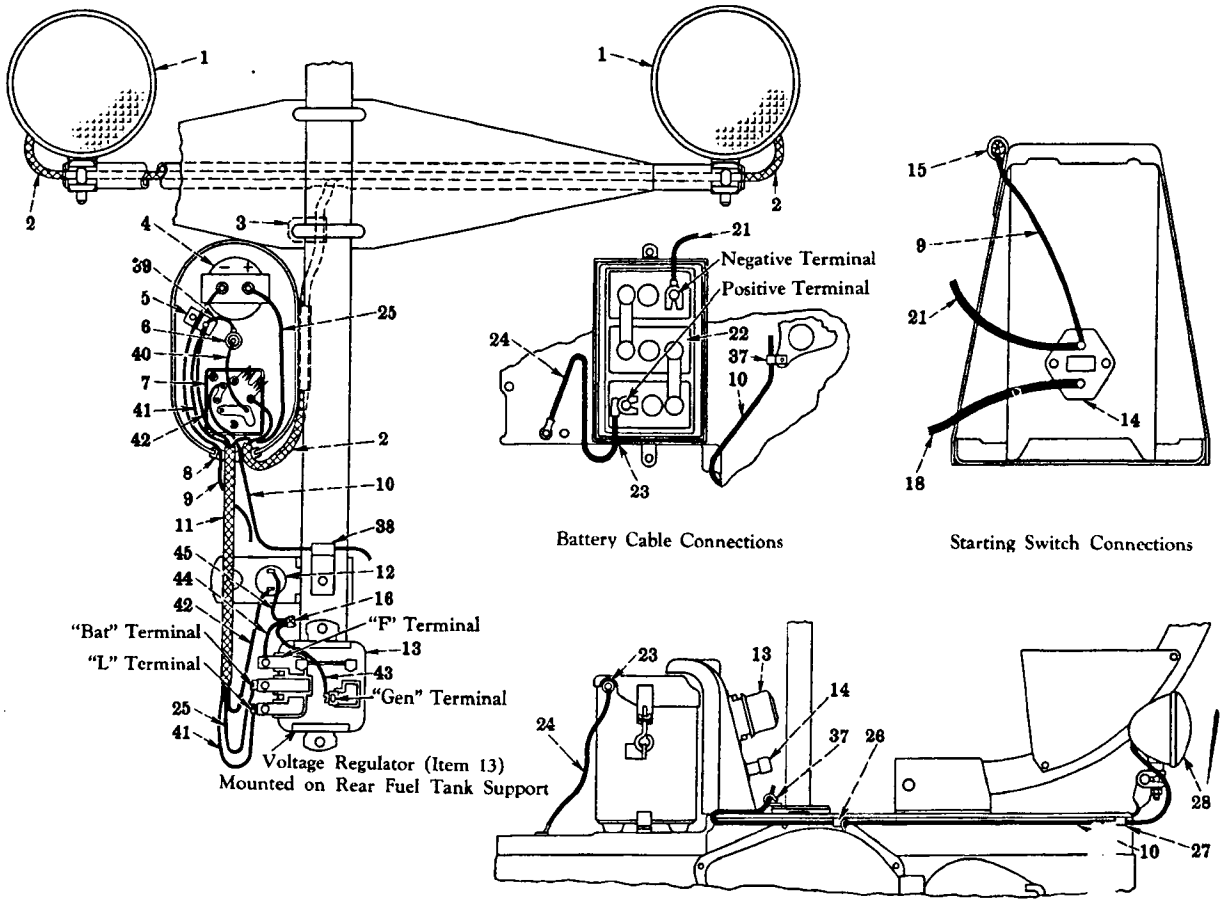
3. Remove the two cap screws which hold the starting motor to the clutch housing and remove the complete starting motor.

To install the starting motor, reverse the removal procedures.



Right Side of Tractor Showing Headlight, Ignition Switch, Regulator, Starting Switch, Battery, Starting Motor, Generator and Battery Ignition Unit Connections

B-4988-A



Headlight, Ammeter, Junction Block, Fuse Housing, Lighting Switch, Ignition Switch and Regulator Connections

Battery Cable Connections

Starting Switch Connections

Left Side of Tractor Showing Battery Ground and Rear Light Connections

B-4987B

Illust. 50

Wiring diagram for starting and lighting on tractors with battery ignition.

Index to reference numbers shown in illustration on opposite page.

Ref. No.	Description	Ref. No.	Description
1	Headlight.	25	Cable—regulator "Bat" terminal to ammeter (natural with black and red cross tracers).
2	Harness—headlight cable.	26	Clip—on brake housing mounting bolt.
3	Clip—on lower "U" bolt of headlight support bracket.	27	Clip—on rear frame cover.
4	Ammeter.	28	Rear light.
5	Junction block—on instrument panel.	29	Clip—on fuel tank front support.
6	Fuse housing.	30	Clip—on steering shaft support.
7	Light switch.	31	Clip—on rear valve cover stud.
8	Grommet—on electrical instrument mounting panel cover.	32	Clip—on front valve cover stud.
9	Cable—ammeter to starting switch.	33	Clip—on generator bracket front mounting bolt.
10	Cable—switch to rear light.	34	Clip—on distributor housing bracket top left-hand mounting bolt.
11	Harness—regulator cable.	35	Battery ignition unit.
12	Battery ignition switch.	36	Generator.
13	Voltage regulator.	37	Clip—on steering post base.
14	Starting switch.	38	Clip—on control bracket mounting bolt.
15	Clip—on rear fuel tank support (upper hole right side).	39	Cable—fuse housing to junction block.
16	Cable harness.	40	Cable—fuse housing to light switch.
17	Clip—on brake pedal stop front mounting bolt.	41	Cable—regulator "L" terminal to junction block (natural with green cross tracers).
18	Cable—starting switch to starting motor.	42	Cable—ignition switch to junction block (natural with black cross tracers).
19	Clip—on main frame cover front bolt.	43	Cable—regulator "Gen" terminal to generator "A" terminal (natural with red cross tracers).
20	Starting motor.	44	Cable—regulator "F" terminal to generator "F" terminal (natural with black tracers).
21	Cable—battery to starting switch.	45	Cable—ignition switch to coil (black).
22	Battery.		
23	Grommet—on battery box.		
24	Cable—battery to ground.		

Starting and Lighting Equipment

(Tractors without Voltage Regulation)

Description

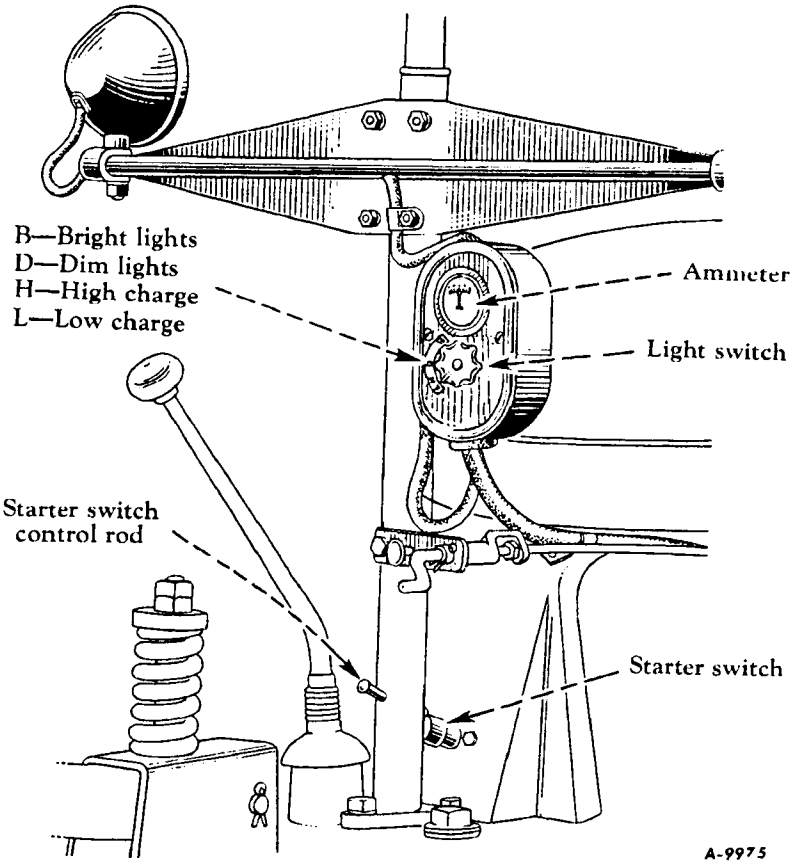
The electrical system of the tractor is a 6-volt type and consists of a generator, generator cut-out relay, starting motor, lights, light switch (also used to manually control the generator output) and a 6-volt battery. The system is a single-wire type with a ground return to the battery. The cables are contained in a harness of nonmetallic, oil and waterproof woven braid.

Use the illustration *on page 52* and the wiring diagram *on page 55* as a guide for identifying the various electrical units and for tracing the electrical cables and connections. Be sure all terminals are clean and securely fastened.

Light and Charging Rate Switch

The light switch not only operates the lights but is also used to manually control the generator output. This switch (*Illust. 52*) can be operated from the operator's seat. The switch has four positions, low charge, high charge, dim and bright.

When the switch is in dim, bright, or high charge position, the field circuit is direct to the ground, giving the maximum generator output for the third brush setting. During the daytime, when the lights are not used, the switch should be placed in the low charge position. This adds a resistance coil to the field circuit and reduces the output of the generator to approximately one-half its original charge rate. If the charge in the battery is low, place the switch in high charge position until the battery is fully charged.



Illust. 52

Starting and lighting switch.

The Fuse

A cartridge type SFE-20 fuse is located on the back of the light switch. If a short circuit occurs in the lighting circuit the fuse will burn out and break the circuit, preventing damage to the electrical system.

It is important to use the same capacity fuse for replacement. If the lights fail, check the fuse. If the fuse continually burns out, check the electrical wiring for short circuits.

To install a new fuse, remove the electrical instrument mounting panel screws, then lift off the panel. Pull the fuse out of the clips on the back of the light switch and replace with a new one.

Lamps

Tractor lights require 6-8 volt, 32-candlepower single-contact type lamps (No. 142309—Trade No. 1133).

Generator

The generator supplies current to keep the battery in a charged condition, replacing the energy consumed by the starting motor and lights. The generator on your tractor is sealed to prevent the entrance of dirt and moisture. It is hinge-mounted on the right side of the engine crankcase and is driven by a V-belt from the fan pulley. The generator as received from the factory has the adjustable third brush set to give an output of approximately 13 to 16 amperes (cold output) and 9 to 11 amperes (hot output).

Do not run the generator until the battery charging circuit and the lead from the "A" terminal of the generator to the "GEN" terminal of the relay are connected. The generator will burn out if operated with any wires of the charging circuit disconnected or broken. If it is necessary to operate the generator without the battery, remove the connection from the "GEN" terminal on the relay and ground it on the relay mounting screw, or remove the cable from the "F" terminal on the generator frame. Refer to the wiring diagram *on page 55.*

Generator Belt Tension

Check the slack of the generator belt to assure maintenance of the correct tension. The belt should never be loose enough to allow slippage and should not be so tight as to cause excessive side-thrust on the generator bearing. Allow approximately ¼-inch slack. *See Illust. 37.*

Adjusting the Generator Belt

The generator belt tension is adjusted by loosening the set screw in the generator pulley flange and turning the flange to obtain a wider or narrower pulley groove. Tighten the set screw after the tension is taken up. (Tension is correct when the belt can be depressed without effort by the thumb, approximately ¼-inch between the two pulleys.) *See Illust. 37.*

Removing the Generator Belt

Remove the generator brace bolt and loosen the generator mounting bolts. Then move the generator in toward the engine and remove the belt from the generator pulley.

Remove the fan belt by loosening the lock nut and set screw in the flange on the fan pulley. *See Ref. No. 2, Illust. 37A.* Then unscrew the flange as far as possible. Start the belt over the outer flange of the lower pulley and pry it out with a light bar or rod. At the same time slowly hand crank the engine and the belt will work off the pulley.

Slip the generator belt through the fan belt and over the fan.

Replacing the Generator Belt

Replace the generator belt when it becomes soaked with grease or badly worn.

When replacing the belt, reverse the procedure outlined *under "Removing the Generator Belt."* Adjust the fan belt and generator belt as described *on pages 37 and 48.*

Cleaning the Generator Commutator

If the commutator is dirty or slightly grooved, it can be polished by placing a piece of No. 00 sandpaper on the commutator while the armature is slowly revolving (*Illust. 49*). *Never use emery or carborundum cloth.* Blow all dust from the commutator after the polishing operation is completed

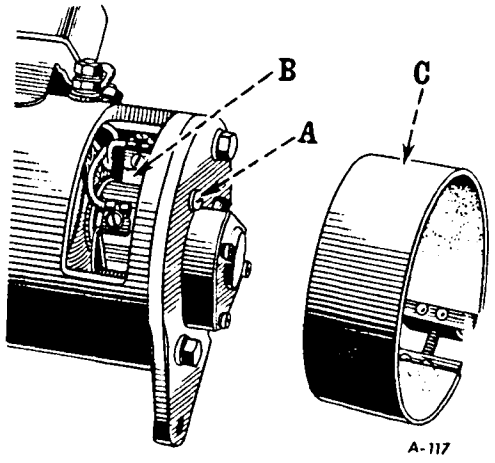
If the commutator is badly worn, rough or out-of-round, it is advisable to take the unit to your International Harvester dealer and have the commutator reconditioned.

To Adjust the Charging Rate by Third Brush

The maximum rate of charge for the generator (with the switch in the High Charge position and with no electrical load) is 9 to 11 amperes when "hot" and 13 to 16 amperes when "cold." *Do not set beyond these limits.* The battery should be fully charged when checking the maximum generator output.

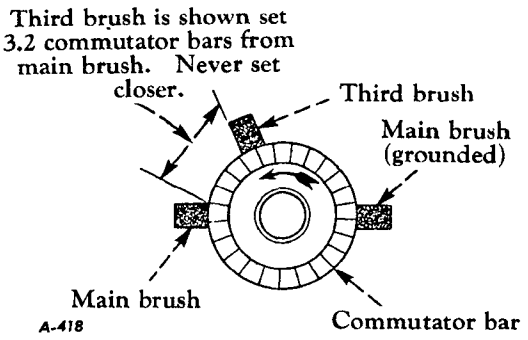
Remove the cover band "C" and loosen the round head screw "A" (*Illust. 53*) on the outside of the commutator end frame until the lock washer tension is released. Do not attempt to remove this screw. Change the charging rate by moving the third brush "B" (*Illust. 53*) (this brush is the one mounted on a movable carrier; the other main brushes are mounted directly on the inside of the commutator end frame). The rate of charge is increased by moving the third brush in the direction of rotation of the armature and is decreased by moving it in the opposite direction.

The third brush should never be set closer than 3/2 commutator bars from the main brush. See Illust. 54



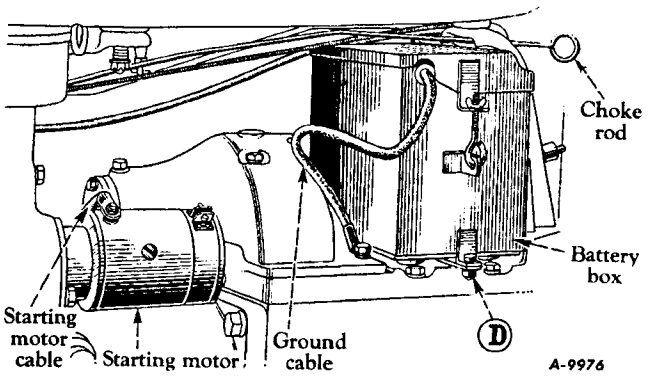
Illust. 53

Generator showing third brush.


Third brush is shown set 3.2 commutator bars from main brush. Never set closer.
Third brush
Main brush (grounded)
Main brush
Commutator bar
A-418

Illust. 54

Commutator end (brush setting).



Illust. 54A

Starting motor and battery box.

Generator Lubrication

Follow the lubricating instructions for the generator as outlined *in the "Lubrication Guide."* Do not lubricate excessively, since excessive oiling may cause the oil and grease to gum on the commutator and will result in a reduction of the generator output and increased commutator and brush wear.

Never oil the commutator and do not lubricate the generator while it is in operation.

When all adjustments have been completed, be sure to tighten the round head screw "A" (*Illust. 53*) which locks the third brush carrier in place. Reassemble the cover band and be sure the opening in the generator is completely covered.

Unless you are familiar with this equipment and know how to adjust it, we recommend that your International Harvester dealer make the above adjustments.

Starting Motor

The starting motor is mounted on the left side of the clutch housing.

At regular intervals, remove the starting motor cover band and inspect the commutator.

To clean the commutator, pull out cable "E" (*Illust. 43*) from the magneto coil cover. Remove the starting motor cover band. Depress the starter switch button and, with the starting motor operating, insert a piece of No. 00 sandpaper over the commutator to clean off dirt and discoloration. *Never use emery or carborundum cloth.* Always blow all dust from the commutator compartment after cleaning.

Starting Motor Lubrication

After every 300 hours of operation, put a few drops of SAE-20 oil in the starting motor oil cup. Also put a few drops of the SAE-20 oil on the bushing at the drive end whenever the motor is removed for service.

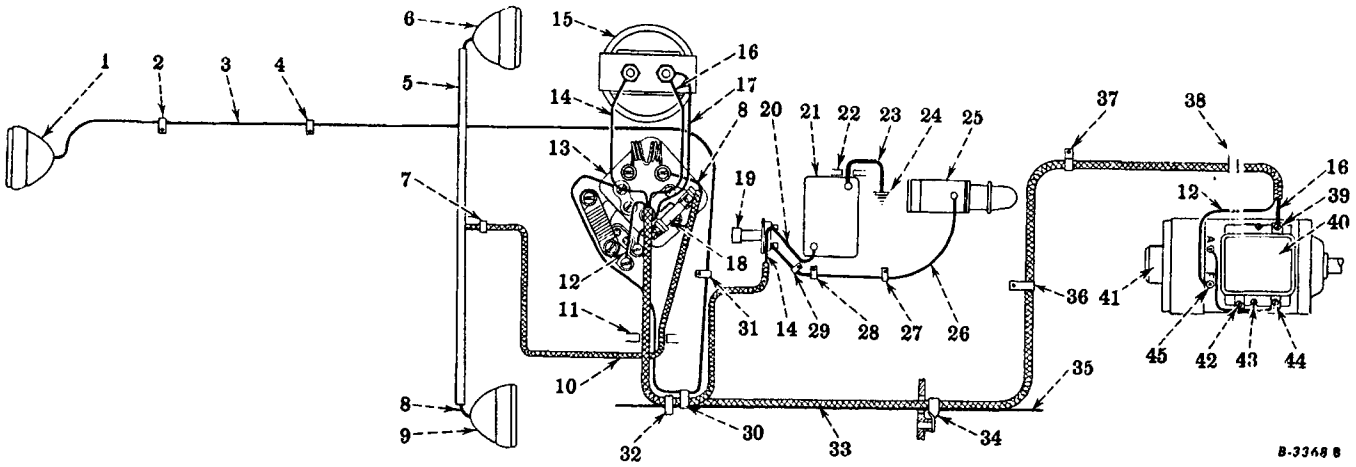
Removing the Starting Motor

1. Disconnect the ground cable from the battery.

2. Remove the cable from the terminal on the starting motor.

3. Remove the two cap screws which hold the starting motor to the clutch housing and remove the complete starting motor.

To install the starting motor, reverse the removal procedures.



Illust. 55

Wiring diagram for starting and lighting on tractors equipped with magneto.

Ref. No.	Description	Ref. No.	Description
1	Rear light.	23	Cable—battery to ground.
2	Clip—on rear frame cover.	24	Ground—on belt pulley housing bolt.
3	Cable—switch to rear light.	25	Starting motor.
4	Clip—on brake housing mounting bolt (upper bolt).	26	Cable—starting motor to starting switch.
5	Headlight support pipe.	27	Clip—on belt pulley housing bolt.
6	Headlight, left.	28	Clip—on main frame cover bolt.
7	Clip—on lower U-bolt of headlight support bracket.	29	Clip—on dash sheet mounting bolt.
8	Cable—switch to headlight (seal brown with black and red cross tracers).	30	Loom clamp.
9	Headlight, right.	31	Clip—on lower right-hand mounting bolt of rear fuel tank support.
10	Headlight cable harness.	32	Clip—on side of rear fuel tank support.
11	Grommet—in instrument panel cover.	33	Cable harness, complete.
12	Cable—generator field to switch (natural with black tracer).	34	Clip—on fuel tank and air cleaner support.
13	Lighting switch.	35	Magneto ignition cable.
14	Cable—starting switch to ammeter (natural with red tracer).	36	Clip—on gasoline tank bracket bolt.
15	Ammeter.	37, 38	Clip—on front and rear valve cover studs.
16	Cable—generator to ammeter (natural with black and red cross tracers).	39	Battery terminal.
17	Cable—ammeter to switch.	40	Relay on generator.
18	Fuse.	41	Generator.
19	Starting switch.	42	"F" terminal on relay.
20	Cable—battery to starting switch.	43	Mounting screw.
21	Battery.	44	"GEN" terminal.
22	Grommet—in battery box.	45	"F" terminal on generator frame.

Storage Battery

Electrical energy, obtained through chemical action, is stored in the battery to be used for starting the engine and for furnishing electric lighting. It is not the source of electricity but only a storage reservoir for use when the generator is not running. In starting, for instance, the battery supplies the energy; but as soon as the engine starts, the generator begins to replace the electricity taken from the battery.

You will receive maximum satisfactory service from your battery by closely following a few simple precautions and service operations.

A registration card is furnished with the battery. The purchaser of a new battery should take the card to the nearest authorized battery service station for registration.

Complete instructions for moist, uncharged batteries (used for export) are included with the battery.

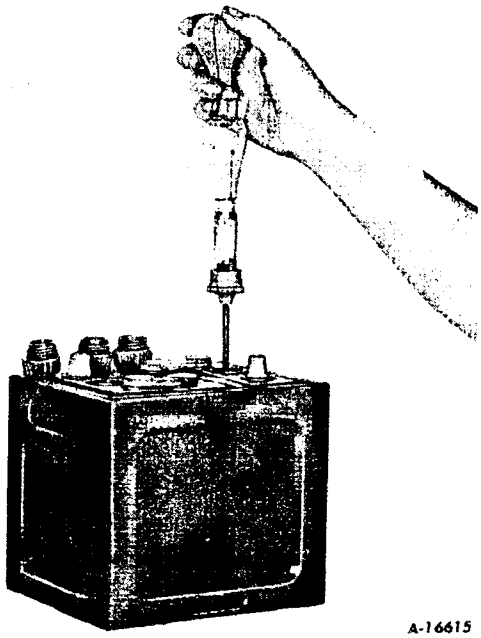
Cleaning and Servicing the Battery: Battery cable terminals must be kept clean and tight. Use hot water for cleaning the top of the battery. Brighten the terminal contact surface with wire wool and reassemble. Be sure the terminals are clamped tightly and that the battery is fastened securely in the battery box. Replace unserviceable cables. Keep the vent holes in the battery filler caps open.

Liquid Level: The electrolyte (acid and water) in each cell should be at star level at all times to prevent battery failure. When the electrolyte is below this level, pure distilled water should be added. If your battery is equipped with automatic liquid leveling devices, follow the directions furnished with the battery or consult your International Harvester dealer. Never use hydrant water or any water which has been in a metal container. Keep pure distilled water on hand in a glass jar for battery use only. Use a clean syringe when adding water and be careful not to allow dirt or corrosive salts to enter the cells.

Acid or electrolyte should never be added except by a skilled batteryman. Under no circumstances add any special battery "dopes," solutions or powders.

Caution! Electric storage batteries give off highly inflammable hydrogen gas when charging and continue to do so for some time after receiving a steady charge.

Do not under any circumstances allow an electric spark or an open flame near the battery. Do not lay tools across battery terminals as this may result in a spark or short circuit which may cause an explosion. Be careful to avoid spilling any electrolyte on hands or clothing.



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Illust. 56

Taking a hydrometer reading of electrolyte in the battery.

The specific gravity of the electrolyte indicates the relative condition of the battery charge and warns when it may be necessary to recharge the battery.

Inspect the battery once every two weeks to maintain the correct specific gravity. The specific gravity of a fully charged battery is 1.275 to 1.300 corrected to 80° F. (liquid temperature). A specific gravity reading of at least 1.250 corrected to 80° F. should be maintained. Never allow the battery to fall below 1.240.

The specific gravity reading will vary with the temperature of the electrolyte. For readings taken at any temperature other than 80° F., a temperature correction must be applied. This is done by adding .004 specific gravity for every 10° above 80° F., and by subtracting .004 specific gravity for every 10° below 80° F.

Example No. 1

Hydrometer reading	1.270
Electrolyte temperature	20°F.
Subtract .024 Sp. Gr.	(.004 x 6)
Corrected Sp. Gr. is	1.246

Example No. 2

Hydrometer reading	1.255
Electrolyte temperature	100°F.
Add .008 Sp. Gr.	(.004 x 2)
Corrected Sp. Gr. is	1.263

Use an accurate hydrometer when testing for specific gravity. Readings should not be taken immediately after adding water.

All cells should show approximately the same specific gravity reading. Wide variations indicate something is wrong.

For service, see your International Harvester dealer or authorized battery service station.

Battery Voltage: With the battery fully charged and on charge at the normal rate, the average cell voltage at 80° F. ranges between 2.5 and 2.7 volts; at 100° F. between 2.4 and 2.6 volts.

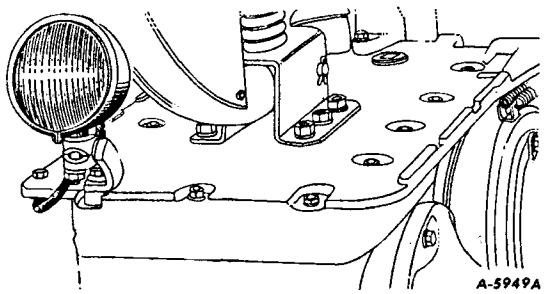
Cold Weather Operation: It is especially important to keep the battery at full charge for cold weather operation. Add water to the battery in freezing temperatures only when the tractor is to operate for several hours, to thoroughly mix the water and the electrolyte, or damage to the battery will result from the water freezing.

The electrolyte of a battery in various stages of charge will start to freeze at temperatures indicated below:

Specific Gravity (Corrected to 80° F.)	Freezing Temperature Degrees Fahrenheit
1.250—¾ charge.....	62° F. below zero
1.200.....	16° F. below zero
1.150.....	5° F. above zero
1.100.....	19° F. above zero

The above temperatures indicate the approximate points at which the first ice crystals begin to appear in the solution. The solution does not freeze solid until a lower temperature is reached. A battery three-fourths charged is in no danger of damage from freezing. Therefore, keep the battery better than three-fourths charged, *especially during winter weather.*

If your tractor is not to be operated for some time during the winter months, it is advisable to remove the battery and store it in a cool dry place above freezing (32° F.). Place the battery on a rack or bench.



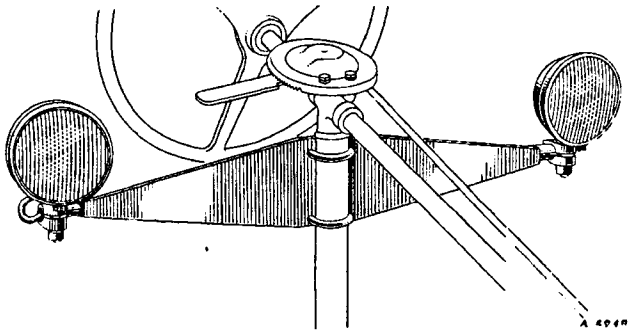
Illust. 57
Rear light mounted on tractor.

Check the battery at least once a month for water level and specific gravity. If the battery shows need of charging it should be given immediate attention. Keeping the battery fully charged not only adds to its life but makes it available for instant use when needed.

When replacing a battery, make certain that the ground cable is connected to the positive (+) terminal on the battery.

Before working on any part of the electrical system, disconnect the battery ground cable.

Do not reconnect this cable until all electrical work has been completed. This will prevent shorting and causing damage to any of the electrical units.



Illust. 57A
Headlights on Farmalls M and MV.

Valve Clearance Adjustment

Check the valve clearance after every 400 hours of operation and adjust the clearance if necessary. A clearance of .017-inch, measured when the valves are closed and the engine is warm, is necessary between the end of the valve levers and the valve stems.

To Adjust Clearance

1. To safeguard against accidentally starting the engine when checking valve clearance, remove the distributor to coil cable "A" from the socket on the coil. *See Illust. 39B.* (On tractors equipped with magneto, remove cable "E" from the coil cover. *See Illust. 43.*)

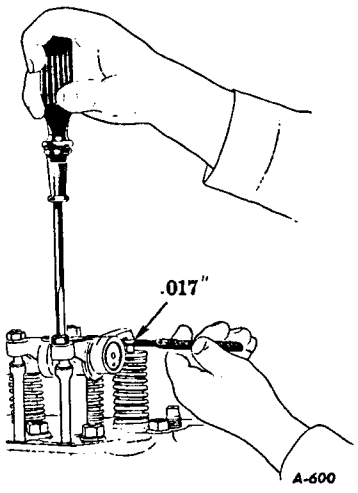
2. Remove the valve housing.

3. Remove the spark plug from the No. 1 cylinder (the cylinder next to the radiator).

Place your thumb over the spark plug opening and slowly crank the engine until an outward pressure is felt. Pressure indicates No. 1 piston is moving toward upper dead center of the compression stroke.

Continue cranking slowly until the first of the double notches on the fan drive pulley (on the crankshaft) is in line with the timing pointer in the front crankcase cover. Both valves are now closed on the compression stroke of No. 1 cylinder.

4. Loosen the lock nut and adjust the screw in the valve lever so the gauge slips snugly between the end of the valve lever and the valve stem. *See Illust. 58.*



Illust. 58

Gauging the valve levers with a feeler gauge.

5. Tighten the lock nut and recheck the clearance.

6. Crank the engine one-half revolution at a time and check the clearance of each cylinder's valves and adjust if necessary. Do this on each set of cylinder valves in succession according to the firing order of the engine, which is 1, 3, 4, 2.

7. Replace the valve housing. Check to see that the valve housing gasket makes an oil-tight seal with the cylinder head. Use a new gasket if necessary.

8. Replace the distributor to coil cable "A" (*Illust. 39B*) or the magneto cable "E" (*Illust. 43*) into the socket from which it was removed.

Important! Be accurate—use a feeler gauge for checking the valve clearance.

Minor Engine Service Operations

Cylinder Head Gasket

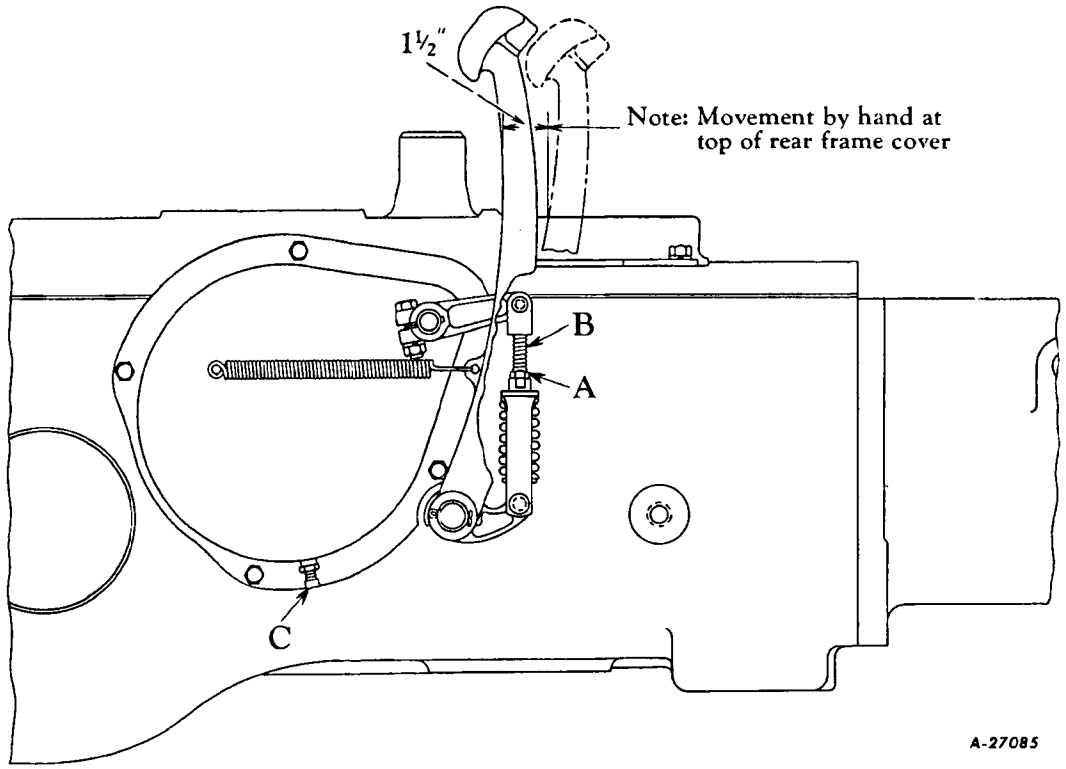
For most satisfactory results in tightening the cylinder head after installing the cylinder head gasket, tighten down all nuts fairly snug, starting with the row in the center, then going to the others. Retighten in the same order, giving each nut a small part of a turn at a time. Continue this until all nuts are tight. Do not screw one nut down perfectly tight and then go to the next as you will not obtain an even pressure on the gasket in this manner.

After replacing the cylinder head, it is necessary to insure against leaks by retightening the stud nuts after the engine has been operating and the water jacket has become thoroughly heated. To properly tighten the nuts the valve rocker shaft assembly must be raised.

Caution: Be sure to adjust the valve tappet clearance after the last tightening of the cylinder head stud nuts. See "Valve Clearance Adjustment."

Crankshaft Bearings, Pistons and Rings

We cannot impress too strongly the necessity of having your International Harvester dealer do the work of replacing the connecting-rod bearings, crankshaft bearings, pistons and rings, and grinding the valves.



Illust. 59

Brake pedal adjustment.

Brakes

The brakes consist of external bands that contract on the brake drums. The brakes are controlled by foot pedals which can be operated individually, or simultaneously when locked together.

Caution: *Always lock the brake pedals together when traveling in high gear.*

The brakes should not drag and should not have an excessive free movement of the pedals before they take hold. Pedals should have a free movement of 1½ inches; measurement to be taken between the points of contact of the brake pedal arms with the top of the rear frame cover, or just enough movement so that when a slight pressure is applied on the brake pedals, the brake lock can be dropped into the first notch in the rack on the left-hand brake pedal arm.

Adjustment

To adjust the brakes, screw in the set screw "C" in the bottom of the housing as far as it will go, then back off one-quarter to one-half turn and lock it.

Obtain the correct free pedal movement by changing the length of brake rod "B" by removing the pin from the clevis, loosening jam nut "A" and turning the clevis either to the right or to the left.

To obtain equalization of both brakes it is very important that both brake pedals have the same amount of free movement. A definite way to check the equalization of the brakes is to jack up both rear wheels so they will turn freely, block the tractor securely and latch the brake pedals together; then start the engine. Shift the gears to third or fourth speed and engage the clutch; while the wheels are turning apply the brakes. Application of the brakes should slow down both wheels at the same time and also tend to reduce the speed of the engine. If one wheel stops and the other one continues to revolve when the brakes are applied, loosen the adjustment on the wheel that stops just enough so that both wheels stop simultaneously when the brakes are applied.

When the correct adjustment has been made, tighten jam nut "A."

Engine Clutch

The engine is equipped with a spring-loaded, 11-inch diameter, single-plate dry disk clutch.

Care of the Engine Clutch

The clutch is designed so that it requires a minimum of attention. It is important, however, that the clutch release bearing be kept properly lubricated. This can be easily done by following the instructions *given in "Lubrication Guide".*

Clutch Clearance

It is very important that a clearance of 3/16-inch be maintained between the clutch release bearing and the clutch release levers. In order to maintain this clearance, the clutch pedal should have a free movement of 1⅛ inches; measurement to be taken between the point of contact of the clutch pedal arm with the rear frame cover when the clutch is fully engaged. As the clutch wears, this free movement decreases and adjustment should be made before free movement has become less than ⅞-inch. The clutch may be badly damaged unless a free movement of the foot pedal is maintained.

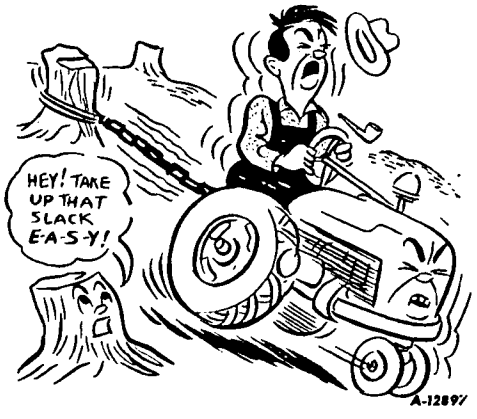
The correct free movement can easily be maintained by adjusting the length of the clutch operating rod between the clutch pedal and the clutch release shaft lever.

Drawbar and Hitch

> Do not attempt to pull when the drawbar is removed.
>
> Drawbar bolts must be kept tight and drawbar braces must be in place.
>
> All hitches for trailing implements must be attached to the drawbar.

The tractor exerts its pulling power on pull-behind implements by means of the swinging drawbar which is adjustable up and down to accommodate different hitches. Proper hitching will save both the tractor and the implement it is pulling from undue strains. Make the hitch so that the center line of pull of the tractor will fall in line with, or at least be near, the center line of draft of the hitched-on implement. Hitching to one side or the other of the line of draft will cause stresses and strains on the tractor and the implement being pulled, frequently great enough to do permanent damage. Incorrect hitching also tends to make the tractor difficult to steer and will result in unsatisfactory work by the implement being pulled.

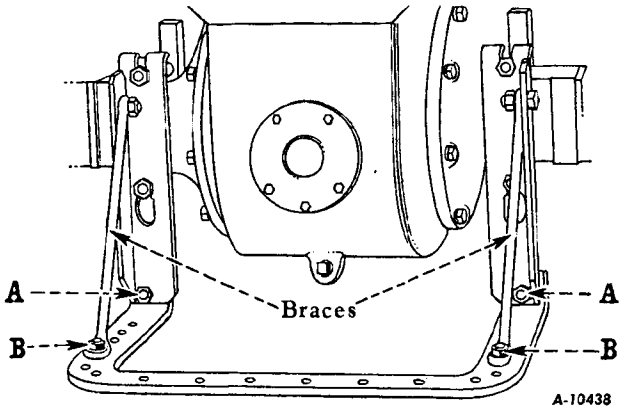
When using a long chain to hitch the tractor to the load, drive the tractor forward slowly until all slack is taken out of the chain.



Always hitch to the tractor drawbar, and when pulling a heavy load, stumps, rocks, or fence posts, don't take up the slack of the chain with a jerk.

Never stand between the tractor and the drawn implement when hitching.

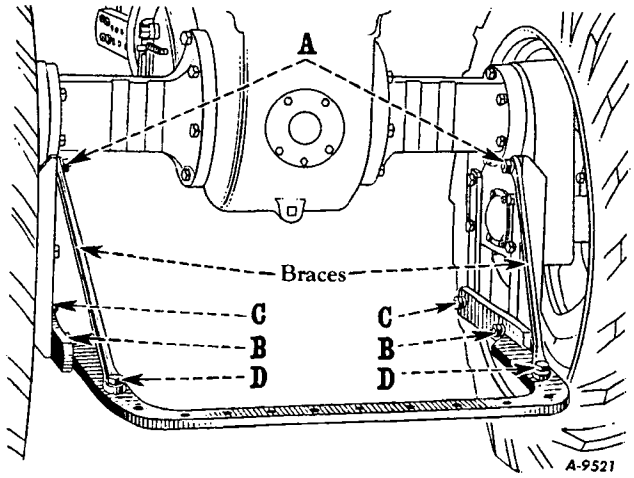
Drawbar Adjustment



Illust. 61

Drawbar adjustment on Farmall M.

Farmall M: To raise or lower the drawbar (*Illust. 61*), loosen the bolts "A", remove bolts "B", and put braces in the desired position. Replace bolts "B," and tighten bolts "A" and "B."



Illust. 61A

Drawbar adjustment on Farmall MV.

Farmall MV: To raise or lower the drawbar (*Illust. 61A*), loosen the bolts "A" and "B", remove bolts "C" and "D", and put the braces in the desired position. Replace bolts "C" and "D" and tighten all bolts securely.

When tractor is pulling power equipment, be sure that all power line shielding is in place and in good order.

Front Wheels

Farmall M

Tractors are equipped with either pneumatic tires or steel front wheels with skid rings. The wheels revolve on two tapered roller bearings. These wheels are equipped with felt and leather seals. A dirt deflector is also provided on the axle to prevent dirt from entering at the inner bearing.

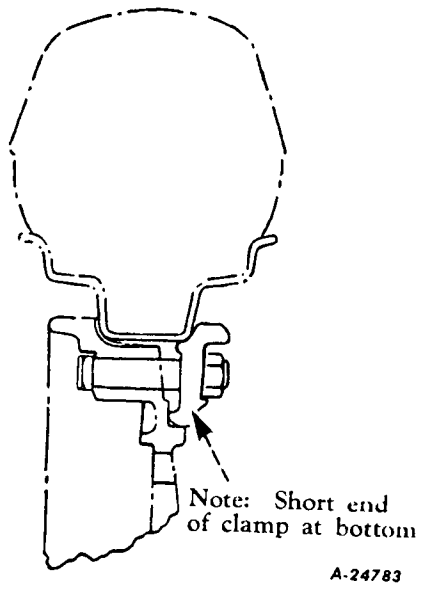
Farmall MV

Tractors are equipped with pneumatic tires. The rims can be set on the wheels to give treads of 60, 63 and 66 inches. *See pages 62 and 63.* The bearing design is the same as on the M.

To adjust and grease the front wheels, *refer to page 30.*

Assembling Rim Clamp

When assembling the front wheel rim, be sure to assemble the clamp in the correct position as shown *in Illust. 62.* Tighten the clamp bolts securely and equally to prevent misalignment of the rim on the wheel.



Illust. 62
Method of assembling front wheel rim clamps.

Method of Adjusting Farmall MV Front Wheel Treads to 60, 63, and 66 Inches

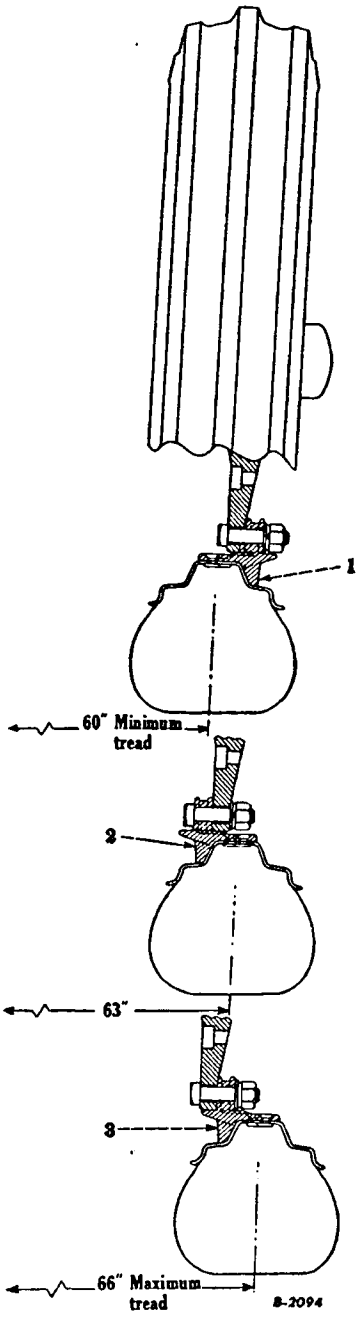
The above front wheel treads are made possible by merely changing the position of the rims on the hubs. To obtain the desired wheel tread, follow the instructions given below for that wheel tread when attaching the wheels to the hubs.

When attaching the front wheel rims to the hubs, be sure to use the plain washers and lock washers *as shown in Illust. 62A,* and tighten all lug bolts securely.

To obtain the 60-inch tread, attach the rim to the outside of the hub with the lugs turned in, *position No. 1.*

To obtain the 63-inch tread, attach the rim to the inside of the hub with the lugs turned out, *position No. 2.*

To obtain the 66-inch tread, attach the rim to the outside of the hub with the lugs turned out, *position No. 3.*



Illust. 62A
Method of adjusting front wheel treads to 60, 63, and 66 inches on Farmall MV.

Adjusting Tread Widths

See Illusts. 67 and 67A.

1. Raise the front end of the tractor.

2. Remove the drag link bolt "H" and the tie rod bolt "G".

3. Pull out the cotter pins and remove the front axle clamp pins "I".

4. Loosen the nuts on the front axle clamps "J".

5. Move the front axle extension an equal distance on each side, to the desired tread position, and reinsert the clamp pins "I" through the front axle clamps "J" and the holes selected in the front axle extension; secure with cotter pins and tighten the front axle clamp bolts.

6. Adjust the tie rod to correspond with the front axle extension, and replace the tie rod bolt "G" to engage with the notch selected, and tighten the bolt.

7. Adjust the drag link sleeve to correspond with the front axle extension and select the notch in the drag link which will permit the front wheels to turn the same angle in either direction. Replace and tighten the drag link bolt "H" (use the hole in the drag link sleeve nearest to the steering gear arm when operating in long wheelbase position).

Note: With this attachment the front wheels can be set in seven different tread positions of 57, 61, 65, 69, 73, 77 or 81 inches. The rear wheels can be adjusted to track accurately with the front wheels.

Adjusting the Toe-In

The correct toe-in of the front wheels should be maintained. To check the toe-in, measure the distance between the two rims at their extreme outer edge at the same height as the hub caps, see "K" and "L". *See Illust. 67.* The distance between the two points "L" should be ¼-inch to ⅜-inch shorter than the distance between the two points "K".

If your tractor is equipped with steel wheels, measure the toe-in from the extreme edges of the wheels at points "K" and "L."

To adjust the toe-in, disconnect the adjusting rod fork at "M" (*Illust. 67A*) by removing the cotter pin and pulling out the adjusting rod fork pin. Loosen the lock nut and turn the adjusting rod fork in or out as required.

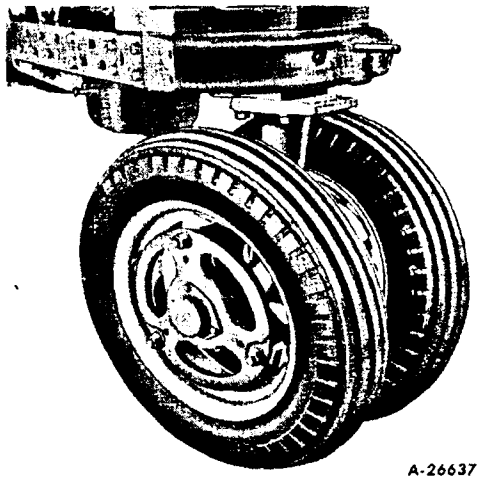
When the proper toe-in (¼-inch to ⅜-inch) is reached, reconnect the adjusting rod fork and tighten the lock nut.

Lubrication

All points of lubrication are equipped with lubrication fittings and require lubrication daily, or after every ten hours of operation.

Use pressure-gun grease (chassis lubricant) and apply two or three strokes with the hand lubricator, or sufficient grease to flush out old grease and dirt.

How to Adjust Variable Tread Front Wheel



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Illust. 63
Variable tread front wheels.

Rim bolts must be tightened securely.

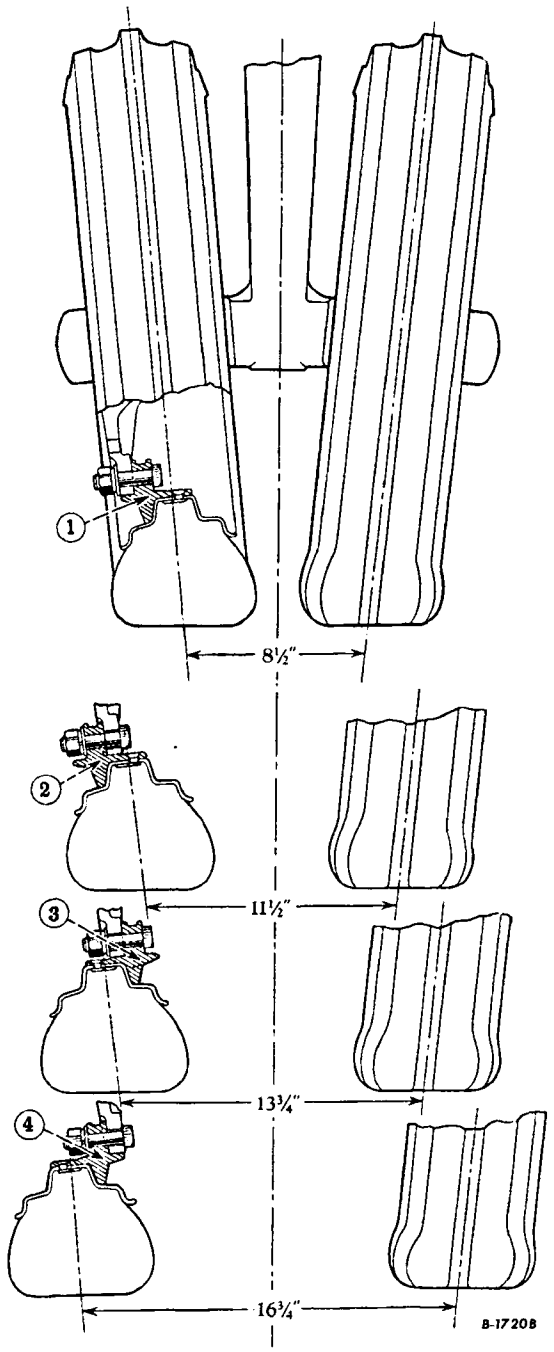
Four treads (8½, 11½, 13¾ and 16¾ inches) can be obtained with variable tread front wheels. *See Illust. 64.*

To obtain the narrow tread or 8½-inch position, assemble the rims to the inside of the hubs with the lugs turned in, *position No. 1.*

To obtain the 11½-inch tread, assemble the rims to the outside of the hubs with the lugs turned in, *position No. 2.*

To obtain the 13¾-inch tread, assemble the rims to the inside of the hubs with the lugs turned out, *position No. 3.*

To obtain the 16¾-inch tread, assemble the rims to the outside of the hubs with the lugs turned out, *position No. 4.*



Front wheel tread adjustments.

Adjustable Wide Front Axle with Adjustable Wheelbase

Farmall M: This attachment adapts the tractor to work in potatoes and other vegetable crops where rows are spaced too close for regular wheels. The axle is adjustable for treads of 57 inches to 81 inches. With the attachment mounted in short wheelbase position, the wheelbase is 90 inches. Mounted in the long wheelbase position, the wheelbase is 100½ inches.

Note: When cultivator attachments are to be used on tractors with adjustable wide front axle, it is necessary to use the cultivator shifter lever attachment. *Refer to page 86 for further information.*

To change from short wheelbase to long wheelbase or vice versa, proceed as instructed in the following paragraphs.

Caution: Be sure the tractor is rigidly supported. Lock the brakes and block the rear wheels.

Raise the front end of the tractor, preferably by means of a sling and hoist arrangement. If a hoist is not available, jacks may be used by placing them under each front frame channel, approximately at "X." *See Illust. 65 for long wheelbase position, or see Illust. 66 for short wheelbase position.* This location will afford proper clearance in assembling the attachment.

Long Wheelbase Position

The axle adapter plate and adapter brace spacers and unused bevel washers furnished with this attachment should be set aside for use when it is desired to use the tractor in the short wheelbase position.

For the long wheelbase position (*Illust. 65*), move the entire assembly of parts under the front end of tractor and attach to the tractor as follows:

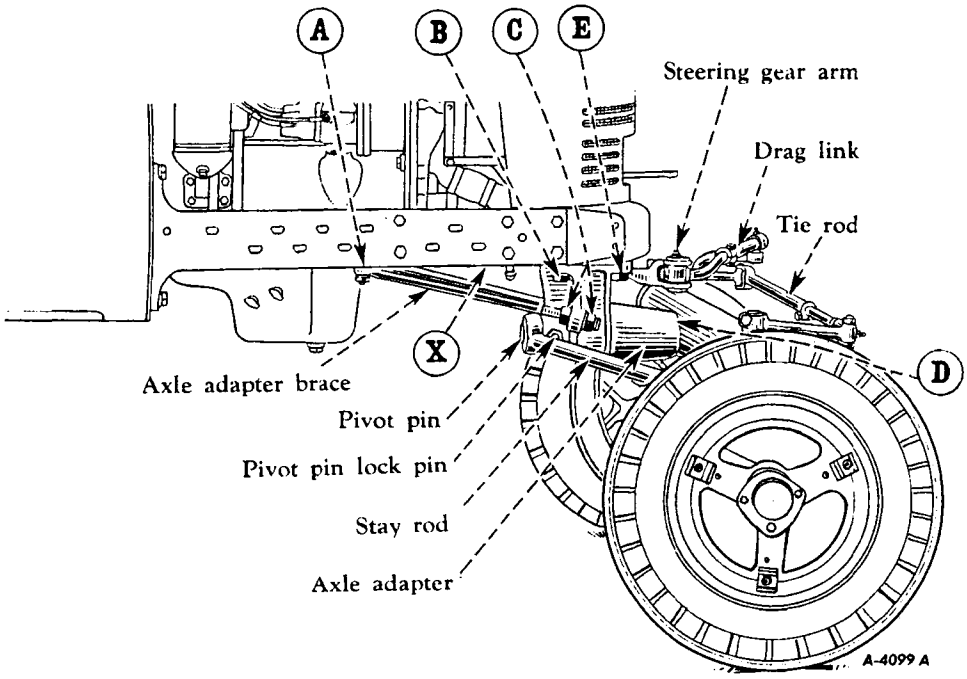
1. Use two ¾ N.C. x 2-inch cap screws, with lock washers, at "E."

2. Use two ¾ N.C. x 2¼-inch cap screws, with lock washers, at "B."

3. Use two ½ N.C. x 2¼-inch cap screws at "A." Slip each cap screw through the bevel washer, frame channel, and adapter brace, respectively; then secure with the nut and lock washer.

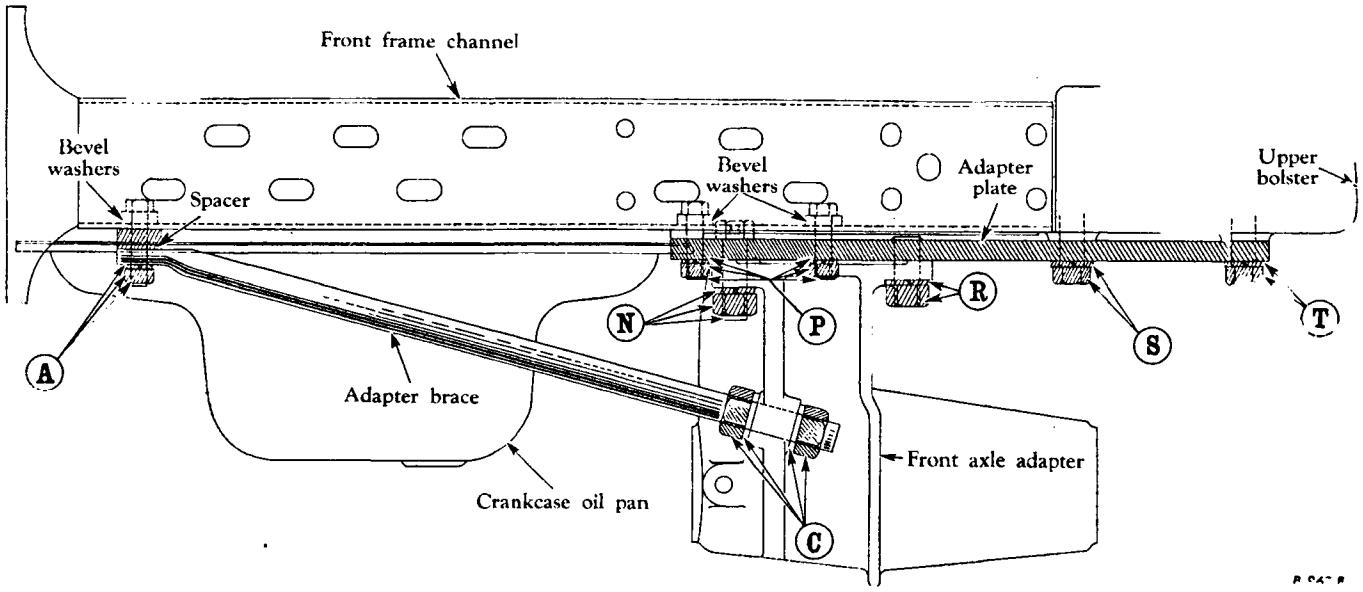
4. Tighten the adapter brace nuts equally at "C."

5. *Refer to Illust. 67A.* Remove the cap screw "H." Then adjust the drag link by lining up the hole in the drag link sleeve nearest the steering gear arm with one of the notches in the drag link adjusting rod which will permit the wheels to turn at the same angle in either direction. Replace and tighten the cap screw.



Illust. 65

Side view showing adjustable wide front axle attachment in long wheelbase position.



Illust. 65A

Farmall M with adapter plate, adapter, and adapter braces assembled to tractor.

Short Wheelbase Position

Attach adapter plate to the adapter (*Illust. 65A*), using two ¾ N.C. x 2½-inch cap screws, nuts and lock washers at "N", and two ¾ N.F. x 1½-inch cap screws, with lock washers, at "R."

For the Short Wheelbase Position (*Illusts. 65A and 66*), move the entire assembly of parts under the front end of the tractor, and attach to the tractor as follows:

1. Use two ¾ N.C. x 2-inch cap screws, with lock washers, at "T."

2. Use two ¾ N.C. x 2¼-inch cap screws, with lock washers, at "S."

3. Use four ⅝ N.C. x 2¼-inch cap screws at "P." Slip each cap screw through the bevel washer, frame channel, and adapter plate, respectively; then secure with the nut and lock washer.

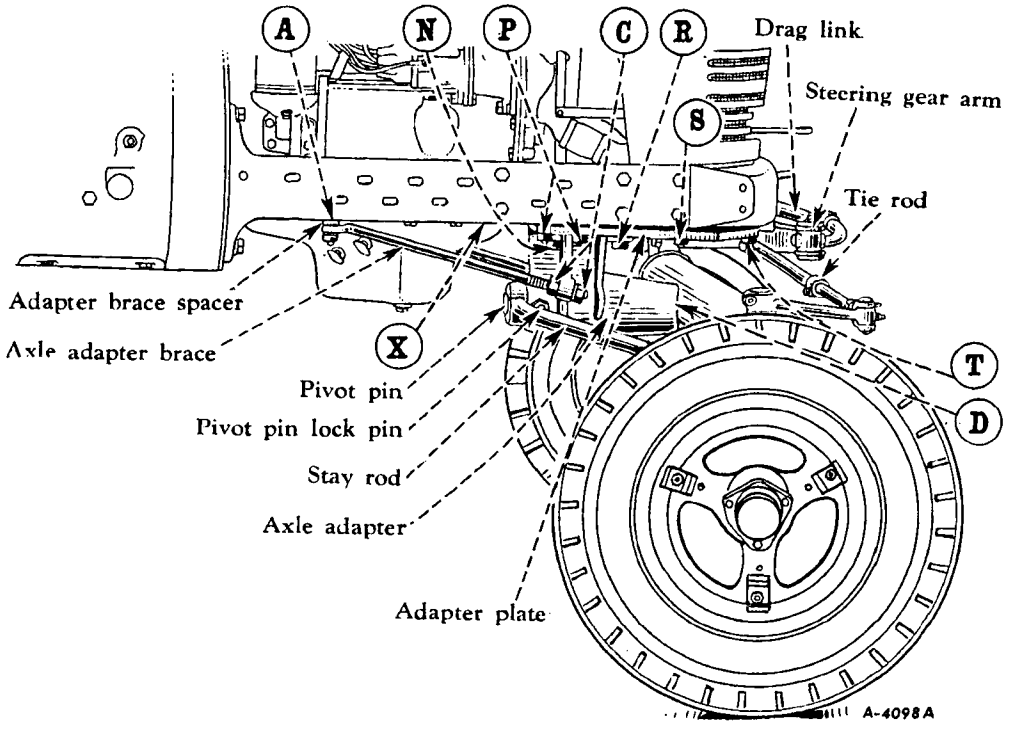
4. Use two ½ N.C. x 2½-inch cap screws at "A." Slip each cap screw through the bevel washer, frame channel spacer, and adapter brace, respectively; then secure with the nut and lock washer.

5. Tighten the adapter brace nuts equally at "C."

6. *Refer to Illust. 67.* Remove the cap screw "H." Then adjust the drag link by lining up one of the holes in the drag link sleeve with the notch in the drag link adjusting rod which will permit the wheels to turn at the same angle in either direction. Replace and tighten the cap screw.

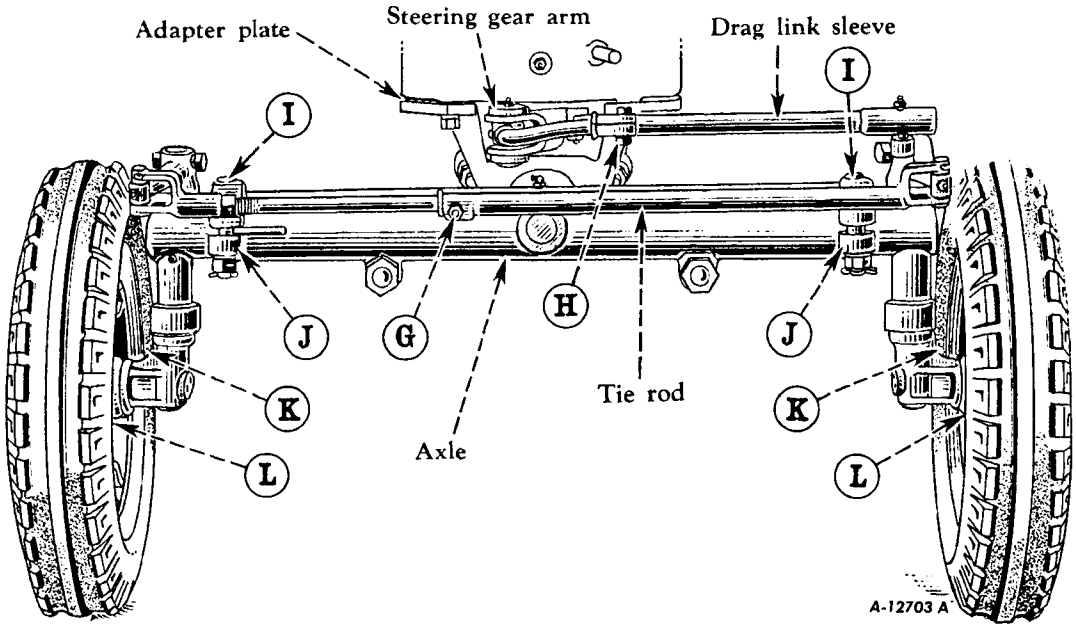
Lubricate all fittings with pressure-gun grease (chassis lubricant). *See page 63.*

Adjust the wheels for correct toe-in. *See page 63.*



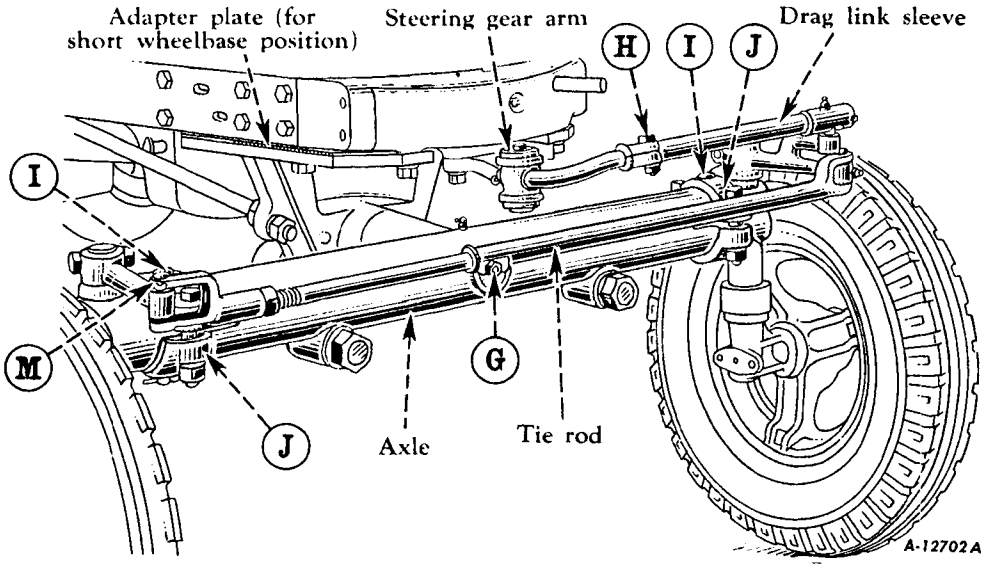
Illust. 66

Side view showing adjustable wide front axle attachment in short wheelbase position.



Illust. 67

Front view showing adjustable wide front axle attachment in short wheelbase position.



Illust. 67A

Front view showing adjustable wide front axle attachment in short wheelbase position.

Rear Wheels

Farmall M: Tractors are equipped with either pneumatic tires or steel rear wheels with spade lugs. The rear wheel tread can be varied from 52 to 88 inches by moving the wheels in or out on the axles and by reversing wheels on the axle. Treads of 52 to 68 inches can be obtained with the wheels turned in and 72 to 88 inches with the wheels turned out.

Farmall MV: Tractors are equipped with cane field type pneumatic tires. The wheels are not adjustable on the rear axle; however, if your Farmall MV tractor is equipped with rear wheel rims with attached clamps, the rims can be reversed on the wheels to give rear wheel treads of 60, 65¾ and 72 inches.

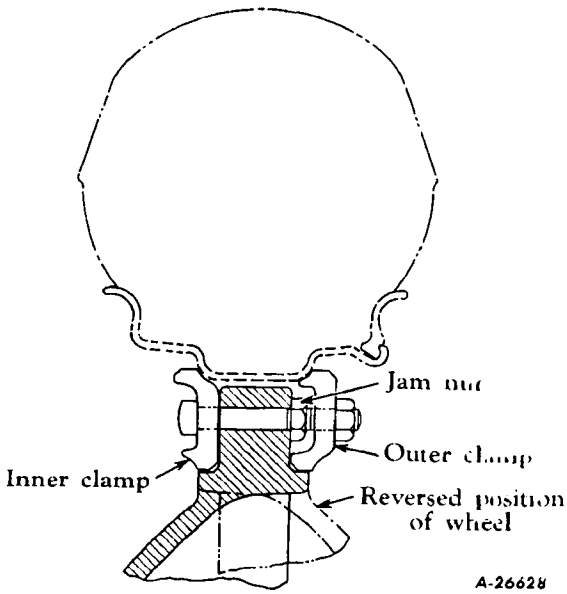
Rear wheels having rims with loose clamps have a fixed tread of 69 inches and are not reversible.

Note: When reversing pneumatic-tired rear wheels, make sure that the tires will rotate in the direction as shown by the arrow on the side of the tires. It may sometimes be necessary to change them from one side of the tractor to the other.

Assembling the Rear Wheel Rim

Assemble the rear wheel rim on the wheel so that the drive lugs on the rim engage in the slot on the wheel. Assemble the rim clamps in the correct position *as shown in Illust. 68.* Tighten the clamp bolts securely and equally to prevent misalignment or slippage of the rim on the wheel. Check the clamp bolts frequently and keep them securely tightened, especially when operating under a heavy load.

The inner clamp is fastened to the wheel with the clamp bolt and jam nut *as shown in Illust. 68,* for convenience when removing and assembling the rim. When the rear wheels are reversed on the axle to obtain various tread positions the inner clamp can also be reversed on the wheel if desired.



Illust. 68
Method of assembling rear wheel rim clamps.

Method of Adjusting Farmall MV Rear Wheel Treads to 60, 65¾, and 72 Inches

(When Equipped with Variable Tread Rear Wheel Rims)

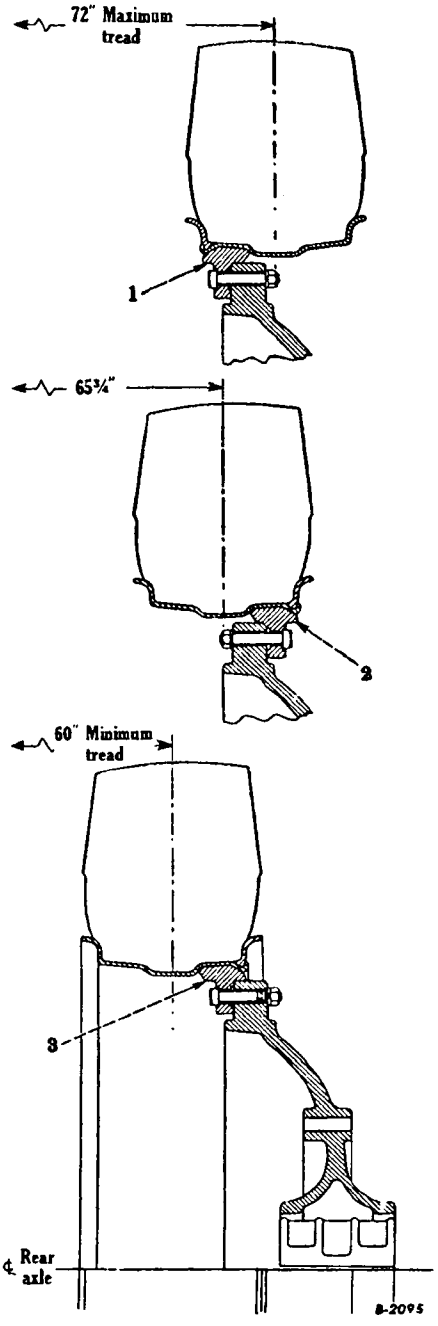
If your Farmall MV is equipped with rear wheel rims having attached clamps, the rims can be fastened to the wheels as described below to obtain the desired tread.

When attaching the rear wheel rims to the hubs, be sure to use the lock washers and tighten all lug bolts securely.

To obtain the 72-inch tread, attach the rim to the inside of the hub with the lugs turned out, *position No. 1.*

To obtain the 65¾-inch tread, attach the rim to the outside of the hub with the lugs turned in, *position No. 2.*

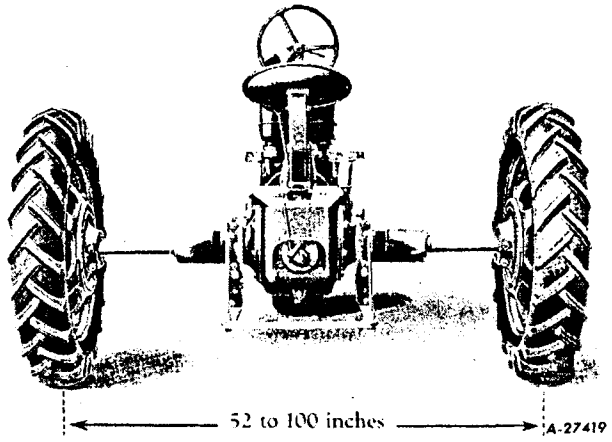
To obtain the 60-inch tread, attach the rim to the inside of the hub with the lugs turned in, *position No. 3.*



Illust. 69

Method of adjusting rear wheel treads to 60, 65¾, and 72 inches on Farmall MV.

100-Inch Tread Rear Axle



Illust. 69A

Tractor with wide-tread rear axle.

The wide-tread rear axle attachment is used on the Farmall M only. This attachment consists of a set of two longer rear axles which, when applied on the tractor, increases the tread of the rear wheels from a maximum of 88 inches (regular) to a maximum of 100 inches.

To Increase Rear Wheel Tread

Raise the rear of the tractor so that one of the rear wheels is off the ground.

Caution! Be sure the tractor is rigidly supported. Lock both brakes and block the front wheels and the other rear wheel.

Place wheel in desired position on rear axle and tighten the clamp evenly and securely. Then, lower the tractor, raise the opposite rear wheel, and proceed as above.

Pneumatic Tires

Observe the following instructions and recommendations in order to secure maximum life and efficient service from the pneumatic tires.

Inflation

Keep the pneumatic tires properly inflated to the pressures shown in the chart below. Underinflation will damage the tire cord body and may cause the tire to slip on the rim and tear out the tube valve stem. Overinflation results in excessive slippage, causing rapid tire wear.

Check the air pressure once a week with an accurate low-pressure gauge having one-pound graduations. Do not allow the air pressure to drop below the recommendations.

Tires can be inflated with a pressure pump, hand pump, or a spark plug pump. Spark plug pumps (*page 86*) can be purchased from International Harvester dealers.

Always see that tire valve caps are in place and are screwed tightly. The caps prevent the loss of air through the valve core, and also prevent loose soil, mud, gravel, snow, and ice from entering and damaging the valve core and air chamber in the tires.

Operating Pressure for Low-Pressure Tractor Tires

The recommended air pressures are shown in the following table.

Caution! Upon receiving your tractor, immediately adjust the air pressure in tires as indicated below.

Front and Rear Tires	Lbs. Per Sq. In.	KG CM²
Front (All Sizes)		
A—4-ply tires	28	1.97
B—6-ply tires	36	2.53
Rear		
C—Minimum inflation pressure, 4 and 6-ply tires	12	.84
D—When plowing, increase pressure in tire on furrow wheel by	4	.28
E—When special heavy wheels are used, or heavy implements such as corn pickers, bedders, etc., are carried on the tractor, inflation pressure must be increased. See Tire and Rim Association schedule or contact the tractor dealer or manufacturer.		
F—Maximum inflation pressure, 4-ply tires	16	1.12
G—Maximum inflation pressure, 6-ply tires	24	1.68

Shipping Tractors Equipped with Pneumatic Tires

When tractors are transported on a carrier, such as a railroad car or trailer, inflation pressures should be as follows to make possible rigid blocking and to prevent bouncing:

All 4-ply front tires.....30 lbs.
All 6-ply front tires.....36 lbs.
All rear tires.....30 lbs.

Important: Deflate the tires to the correct operating pressure before the tractor is transported under its own power, towed, put into service, or placed in storage for any length of time; otherwise, the rubber will check or crack.

Maximum speed for highway use should not exceed 20 m.p.h. For farming operations a maximum speed of 10 m.p.h. is recommended.

When towing tractors, do not exceed a speed of 20 m.p.h.

Towing

When towing is necessary, use a tow rope or cable and have an operator to steer the tractor and operate the brakes.

Attach a tow rope or cable to the tractor front frame channels or to the lower portion of the upper bolster. In no case should the attachment be made to the lower bolster. When towing a tractor, do not exceed a speed of 20 m.p.h.

Mounting Tires on the Rim

After mounting a new or old tire on the rim, inflate it to 30 lbs. pressure to seat the tire bead on the rim flange and to prevent the tire from creeping and shearing off the valve. Then deflate or inflate the tire to the correct operating pressure.

Traction and Weights

The tractor should not be operated with the tires improperly inflated. To insure the maximum hours of service, watch the tread lugs; if they wear down too fast, immediately add more weight to cut down slippage. Check for high air pressure. *Consult your International Harvester dealer for information.*

Wheel Weights

The drawbar pull of a tractor can be increased by adding cast-iron weights to the driving wheels, and by the use of liquid in the tire tubes.

The amount of the increase in drawbar pull by the addition of certain definite weights varies with the type of soil. When very heavy weight is required, both liquid and cast-iron weights can be used.

Overloading

Do not overload the tractor tires by mounting implements on the tractor which exceed the load capacity of the size of the tires on the tractor.

After adding weight to the rear wheel it may be necessary to readjust the height of the drawbar to obtain the correct alignment.

Liquid Weight

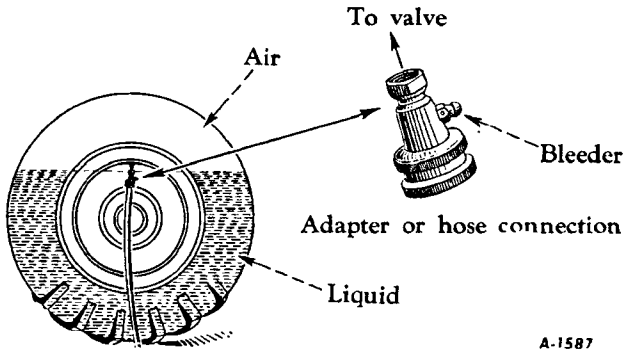
Tractor tire tubes can be three-quarters filled with liquid, using clean water for temperatures above freezing (32° F.). A calcium chloride solution ($CaCl_2$) is recommended when operating in freezing temperatures.

Putting Liquid into the Tube

Purchase an adapter (*Illust. 71*) from an International Harvester dealer. The adapter is equipped with a bleeder for letting out the air displaced by the liquid.

Jack up the tractor and revolve the tire so the valve stem is on top. Remove the valve core housing and screw on the adapter, then attach the water hose to the adapter.

The liquid can be put into the tube from a tank placed at least five feet higher than the tire, or by using a hand force pump, or compressed air and a pressure tank filled with liquid.



Illust. 71

Tire three-quarters full of liquid.

Remove the hose and adapter; then replace the valve core housing and inflate the tire to the correct operating pressure.

Liquid Weight for Freezing Temperatures

Calcium chloride solution, using a 25% mixture, which is approximately 20 lbs. of flaked calcium chloride to 10 U. S. gallons of water, is recommended when freezing temperatures prevail.

The strength of the solution can be checked with a battery hydrometer. A 25% solution measures approximately 1.225 specific gravity and has a freezing point of 25° below zero.

Caution: Some calcium chloride flakes have an acid reaction. It is advisable to add one pound of lime to each 100 pounds of calcium chloride used.

When preparing the calcium chloride solution, always pour the water into the container first, then add the correct amount of calcium chloride crystals, stirring the mixture thoroughly. Never pour the water on the calcium chloride flakes. After the solution is mixed, allow it to cool before using.

Valve Stem Mounting Cones

Valve stem mounting cones are furnished with all rear wheel tire tubes having valve stems for inserting liquids; the cones are mounted on the valve stem at the factory.

The purpose of the cone is to hold the valve stem in the valve hole when mounting the tire, particularly when liquid is used in the tire. Without the cone when mounting the tire or inserting the liquid, the valve stem might be pulled into the rim and will cause extra work in again inserting it through the valve hole.

Care of Tires

Avoid stumps, stones, deep ruts and other hazards. Cuts in tires should be repaired immediately as neglect decreases tire life.

Keep the tires free from oil and grease as both destroy rubber.

After using the tractor for spraying (insect control work), use water to remove any chemicals that may be on the tires.

Tire Protection During Storage

When not in use, store the tractor so the tires are protected from the light. Before storing the tractor, clean the tires thoroughly. Jack up the tractor so the load is off the tires when it is to be out of service for a long period. If not jacked up, inflate the tires at regular intervals. Before driving the tractor, inflate the tires to the correct operating pressures.

Tire Chains

In wet grass or ground conditions, use lug-type chains. The flexing of the tire and the creeping of chains will break the mud loose as the wheel rotates.

There is a possibility of the tire slipping within the chain; to prevent this, the use of spring-type chain fasteners is recommended.

Static Electricity in Tractors Equipped with Pneumatic Tires Doing Belt Work

Static electricity generated by belt work can be discharged harmlessly by attaching a chain to the tractor and allowing it to touch the ground.

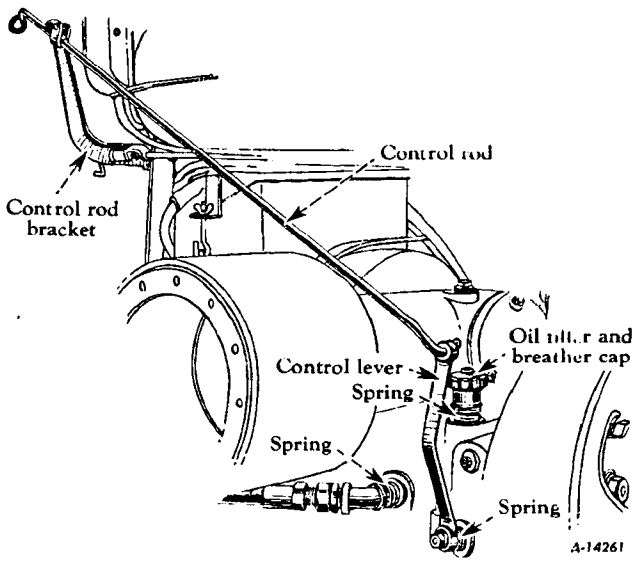
Hydraulic Lift-All

The Hydraulic Lift-All system is ready to operate whenever the engine is running. You will obtain maximum satisfactory service by closely following a few simple precautions and service operations.

There are three pressure outlet holes on the Lift-All, two on the left side and one on the right. Pipes with elbows welded on are screwed into the pressure outlet holes through holes in the clutch housing. Plug the elbows to keep dust out and oil in when the cylinder hoses are not connected.

The front outlet "A" (*Illust. 72A*) on the left side and the one on the right side are to be connected to the cylinders for lifting all implements when the third, or delayed lift cylinder, is not used.

In cases where the third cylinder, or the delayed lift cylinder, is used for automatically lifting the rear

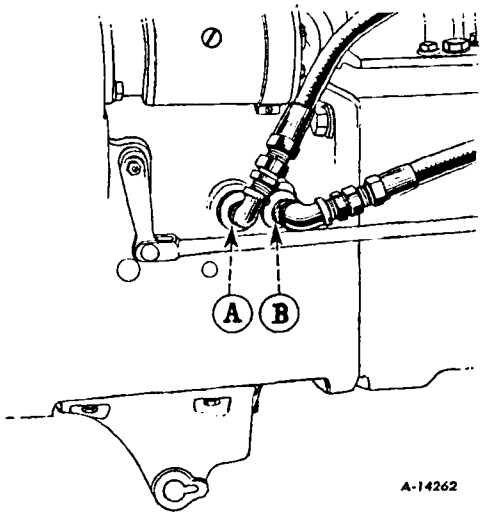


Illust. 72

Control rod, bracket, and oil filler cap.

of an implement after the front section has been raised, connect the front outlets to the cylinders lifting the front section of the implement, and connect the rear outlet "B" (*Illust. 72A*) on left side of the tractor to the cylinder which raises the rear section.

When connecting the hose to cylinders, always use two wrenches; one wrench to keep hose from twisting and the other wrench to tighten the union. Bending the hose will not damage it, but twisting is very hard on it.



Illust. 72A

Left side of tractor showing front and rear outlets.

MAINTENANCE

Lubrication

Check the oil to see that it is up to the "full" mark on the bayonet gauge (located inside of the filler cap). *See Illust. 72.*

At least once a month when using the Lift-All, remove the plug from the top of the filler cap, insert a wire and remove the packing. Clean in kerosene and repack in the filler cap. This packing, when clean, allows the Lift-All to breathe and prevents dust from entering. Do not carry oil in the Lift-All above the full mark on the oil gauge. If reservoir is too full, oil will be forced out of the oil filler cap. Add only a very small amount of oil if the Lift-All does not come all the way up and if the gauge does not register to the full mark.

The oil reservoir should be drained and filled with new oil once a season. About six (6) quarts are required. *Do not use oil drained from the engine crankcase for the Lift-All. This oil may appear usable, but contains impurities that are injurious to the hose.*

Fill the Lift-All to the full mark on the bayonet gauge with a clean, good quality engine oil of the same viscosity as used in the engine of your tractor. It should be filled when the implements are in the down position. *Never fill when implements are raised.*

Sand, dirt or grit of any kind is the worst enemy of the Lift-All, and every care should be used in filling the oil reservoir and disconnecting and connecting the hose to prevent dirt from entering into the hose or fittings. When the Lift-All is not in use, keep the outlets plugged and the cylinder hose capped.

Care and Operation of Lift-All Cylinders

When setting up a new implement that is built to operate with the Lift-All, or when installing the Lift-All on a tractor previously purchased, all that is necessary to put the cylinders into service is to connect them to the implement and to the pump unit, according to the directions furnished with the implement, using the high pressure hose and fittings furnished.

The cylinders are single acting. The oil pressure, acting on one side of the piston, pushes the piston rod out. The weight of the implement and the pressure springs, when used, pushes the piston rod in.

When doing drawbar work, belt work, or any work not requiring the cylinders, the cylinders and hose may be left on or removed from the tractor and hung up or laid in a clean, dry place, and the end of the hose capped with the cap furnished with the cylinders.

When the cylinders and hose are removed, the outlet elbows in the pump unit should be tightly plugged with the pipe plugs furnished with the Lift-All to prevent losing the oil, and also to prevent dirt entering the pump unit.

Beware of sand or grit in the Lift-All. When disconnecting or connecting the hose, every care should be taken to prevent the end of the hose or any of the connecting parts from coming in contact with the ground or any object where dirt or sand is present. The oily surfaces will readily pick up any sand or grit which they contact. Sand or grit will destroy the working parts of the pump very rapidly

MAINTENANCE

Trouble Shooting

Possible Cause	Possible Remedy
Hard to Start	
No gasoline in starting tank or carburetor	Fill tank with gasoline, open fuel shut-off valve. Check fuel lines, fuel strainer and carburetor.
Distillate in starting fuel or carburetor	Drain the carburetor and use gasoline for starting, *refer to page 12.*
Gasoline strainer or fuel lines clogged	Clean fuel strainer, Check fuel lines and carburetor
Impulse coupling inoperative (tractors with magneto)	Flush with kerosene; *refer to page 43.*
Water in gasoline	Drain fuel tank and carburetor. Use new fuel and dry the spark plugs; or see your dealer.
Water in cylinders	Check cylinder head gasket or look for clogged drain hole in exhaust manifold or muffler.
Choked improperly. Flooded engine	Follow starting instructions *on page 10.*
Defective ignition or loose wiring	Check wiring, plugs, battery ignition unit or magneto, etc.; *refer to pages 39 to 55.*
Defective battery or starting motor	Check and service; *refer to pages 49 to 57, or replace.*
Spark plugs dirty or improper gap	Clean, adjust gap to .023", or replace plugs.
Magneto grounded (tractors with magneto)	Pull out on ignition switch. Check for other possible ground; also refer to magneto instructions *on page 42.*
Engine speed control not advanced	Advance lever one-third for starting.
Lack of compression	Check cylinder head gasket, see your dealer.
Flywheel ring gear teeth broken	See your dealer.
Too heavy grade of lubricating oil	Drain and refill with proper lubricant. *Refer to lubricant specifications on pages 29 and 30.*
Gears engaged	Put gearshift in neutral.
Internal seizure	See your dealer.
Engine Operates Irregular or Knocks	
Engine incorrectly timed	Retime. *See "Timing the Distributor to the Engine" on page 42, or "Installing and Timing the Magneto to the Engine" on page 45.*
Spark plugs dirty; wrong gap or wrong type	Clean, reset gap to .023", or replace.
Poor or weak spark	Check battery ignition unit or magneto to see if spark is good from coil. Check breaker points and breaker point opening, spark plugs, and wiring; *see page 39.*
Carburetor setting incorrect	Adjust as per carburetor instructions; *see page 33.*
Poor grade fuel or water in fuel	Drain and use a good grade of clean fuel.
Engine overheating	Check cooling system and fan belt; adjust radiator shutter if used; *see "Engine Overheats" on page 75.*
Operating a cold engine on distillate	Warm up engine on gasoline before changing over to distillate fuel.
Engine valves at fault	Check valve clearance, or see your dealer.
Air leaks around intake manifold	Check gasket and tighten nuts.
Engine smokes	Check air cleaner oil level. Check fuel delivery at carburetor. Check for worn piston and rings, or see your dealer.
Excessive carbon in engine	See your dealer.
Loose piston pin or bearings	See your dealer.
Broken rings or loose pistons	See your dealer.
Worn connecting rod and main bearings	See your dealer.
Governor sticking or needs adjustment	See your dealer.
Lack of Power	
Engine speed lever not advanced	Advance speed control lever.
Engine cold or overheated	Run engine until it warms up before putting under load. Adjust radiator shutter if used. Check cooling system, or see your dealer.
Engine overloaded	Reduce load.
Engine knocks excessively	Use good fuel; also check timing, or see your dealer.

Possible Cause	Possible Remedy
Governor not working properly	See your dealer.
Poor compression	Service valves and piston rings, or see your dealer.
Poor fuel or too lean a mixture	See carburetor instructions *on page 33.*
Fuel lines or strainer obstructed	Clean; *see page 32.*
Fuel tank air vent closed	Open vent in cap.
Exhaust pipe clogged	Clean out.
Air cleaner clogged or air leakage between carburetor and engine	Clean air cleaner as instructed *on page 38.* Tighten carburetor and manifold mounting nuts.
Too heavy oil in crankcase or air cleaner	Drain and refill with proper lubricant. *Refer to lubricant specifications on pages 29 and 30.*
Incorrect timing or faulty ignition	*See "Battery Ignition" (page 40) or "Magneto" (page 42).*
Clutch slipping or oil on facings	Adjust free travel of pedal; *see page 60;* replace facings or see your dealer.
Brakes drag	Adjust brakes; *see page 59.*
Carburetor intake manifold or cylinder head intake ports restricted by carbon	Clean or see your dealer.

Engine Overheats

Cooling system clogged or limed	Clean system; *refer to pages 35 and 36, or see your dealer.*
Water pump leaks	Tighten packing nut or repack.
Thermostat left out or not functioning	Install new thermostat of correct range.
Radiator cap not pressure-tight	Screw on tight, install new gasket assembly, or replace with new cap.
Fan belt slipping	Adjust or replace belt; *refer to page 37.*
Insufficient water in cooling system	Fill radiator to proper level; *refer to pages 35 and 36.*
Radiator cores clogged	Remove all chaff or dirt from the radiator grille, clean with forced air or water.
Wrong kind of fuel	Change to a good grade of gasoline.
Carburetor improperly set	Refer to carburetor *on page 33.*
Timing incorrect	*See "Battery Ignition Unit" (page 42) or "Magneto" (page 45).*
Breaker point gap incorrect	Adjust gap *per "Battery Ignition Unit" (page 40) or "Magneto" (page 43).*
Excess load	Reduce load.
Excess carbon in engine	See your dealer.
Temperature gauge defective (distillate engine)	Replace gauge, or see your dealer.
Radiator shutter closed (if used)	Open shutter.

No Oil Pressure, Too High or Too Low

Defective oil gauge	Replace, or see your dealer.
Wrong grade, diluted or insufficient oil	*Refer to lubricant specifications (pages 29 and 30).* Check oil level; if diluted, replace with fresh oil; *refer to operating instructions.*
Broken, loose or plugged oil lines	Clean and tighten, or see your dealer.
Low oil level in crankcase	Add oil; *refer to "Lubrication Guide."* Check for oil leak
Defective or dirty oil pressure regulating valve	See your dealer.
Oil pump strainer clogged or pump not working	Clean as instructed *on page 20,* or see your dealer.
Worn bearings	See your dealer.
Crankcase breather clogged	Clean element as instructed *on page 20.*

Oil Dilution or Uses Too Much Oil

Incorrect grade of oil	*Refer to lubricant specifications (pages 29 and 30).*
Leaks in oil lines or filter or in oil pan plug or gasket	Check and tighten, or see your dealer.
Worn piston, oil rings or cylinders	See your dealer
Loose connecting rod bearings	See your dealer.
Long engine idling	Stop engine.
Engine overheating or too cold	*Refer to section "Lack of Power and Engine Overheats."*
Engine speed too high	See your dealer.
Crankcase breather clogged	Clean element as instructed *on page 20.*

Possible Cause	Possible Remedy

Using Too Much Fuel

Fuel mixture too rich. Carburetor out of adjustment	Check choke and see *"Carburetor" on page 33.*
Fuel leaks	Tighten or replace fuel lines or fuel strainer gasket
Poor grade of fuel	Use a good grade of gasoline.
Choke closed	Investigate for choke not operating.
Engine overloaded	Reduce load or shift to lower speed.
Poor compression	See your dealer.
Faulty ignition	*Refer to pages 39 to 45.*
Engine not operating at proper temperature	Check cooling system. Check lubricating oil, or see your dealer.
Air cleaner clogged	Service air cleaner; *see page 38.*
Incorrect grade or amount of lubricating oil	*Refer to lubricant specifications on pages 29 and 30, and keep the oil up to the proper level.*

No Fuel at Carburetor

Fuel low in tank	Fill fuel tank and check fuel lines.
Air vent hole in fuel tank cap plugged up	Clean out vent hole.
Fuel valve closed or partly open	Open valve; *refer to the starting instructions on pages 10 and 12.*
Dirty or clogged fuel strainer screen or line	Clean as instructed *on page 32.*

Ignition and Electrical

Wrong kind, old, cracked, dirty, or poorly set spark plugs	Clean and set gap to .023", or replace with new plug.
Loose wiring or improper connections	Check wiring to see that all connections are clean and tight; *see pages 39 to 57.*
Battery ignition unit or magneto not timed correctly	Retime as instructed *on page 42 or 45.*
Distributor cap or rotor or breaker chamber dirty	Clean as instructed *on page 41 or 44.*
Breaker points dirty, pitted or improperly set	Clean and reset gap or replace with new; *see page 40 or 43.*
Breaker arm stuck, weak or broken spring	Check and replace; *see page 40 or 43.*
Impulse coupling dirty (tractors with magneto)	Clean and lubricate as instructed *on page 42.*
Battery defective, low charge or loose connections	Recharge, clean and tighten cable lugs or replace with new; check ground cable; *refer to pages 46 to 57.*
Starting motor failure	Replace, or see your dealer.
Generator inoperative	Clean commutator, check brushes; *see page 48,* or see your dealer.
Voltage regulator or generator relay	See your dealer.
Ammeter inoperative	Replace ammeter, or see your dealer.
Ammeter shows excessive charge	Adjust generator charging rate (tractors with magneto); *see page 53.*
Ammeter shows discharge	Check battery and generator; check drive belts and wiring.
Lights will not burn	Check battery ground cable. Turn on switch, replace lamps, replace fuse, recharge battery, check wiring and generator, or see your dealer.
Lights burn dim	Turn switch to bright. Recharge battery, tighten cable terminals, check lamps, clean contacts.

Brakes

Do not hold	Adjust brakes (*page 59*), or new lining needed, or see your dealer.
Drag or uneven	Adjust brakes; *see page 59.*
Grease on lining	Replace lining, or see your dealer.
Return spring broken	Replace.
Do not release	Release brake lock.
Drum out-of-round	See your dealer.

Possible Cause	Possible Remedy

Transmission

Hard to shift gears	Use correct grade of lubricant; *see pages 29 and 30.*
Shifter fork or lever defective	Replace, or see your dealer.
Engine clutch drags	*Refer to "Lack of Power."*
Gears clashing	Stop tractor and disengage clutch before shifting gears.
Gears slipping out of mesh	See your dealer.
Noisy	Check oil level; use proper grade lubricant, or see your dealer.
Damaged parts	See your dealer.

Rear Wheels

Do not turn	Release brake lock. Transmission, differential or clutch faulty. *Refer to "Transmission" above,* or see your dealer.

Front Wheels

Too tight or too loose	Check lubricant in bearings and grease retainers, check bearing adjustment; *see page 30.*
Lubricant leakage	Check oil seal, or see your dealer.

Steering

Faulty	Check steering worm and gear, check front axle adjustment; *see pages 61 to 67.* Check lubricant in front wheel. Check tire inflation, or see your dealer.
Defective front axle	Inspect linkage, check and replace faulty parts, or see your dealer.
Tractor turns to one side	Check and adjust brakes evenly; *see page 59.* Check pneumatic tire air pressures. Check front axle adjustment; *see pages 61 to 67.*

Pneumatic Tires

Excessive or uneven wear	Check for toe-in; *see page 63.* Check air pressure and load on tires; *see page 70.*
Slippage, rear tire	Add more weight, and check for high pressure; *see page 70.* If tread is badly worn, tires may slip more readily. Replace with new tires or use lug-type chains

Hydraulic Lift-All

Refer to detailed instructions *on pages 72 and 73,* or see your dealer.

MAINTENANCE

Storing and Housing Your Tractor

When your tractor is not to be used for some time, it should be stored in a dry and protected place. To leave equipment outdoors, exposed to the elements, will result in materially shortening the life of the machine.

Follow the procedure outlined below when your tractor is placed in storage, and repeat the lubrication precautions every six months thereafter. We also recommend that caution be practiced in starting an engine that has been in storage.

1. Wash or clean and completely lubricate the tractor (*refer to "Lubrication Guide"*).

2. Drain and flush the cooling system.

3. **Tractors with magneto:** Oil the magneto impulse coupling liberally with very light oil such as cream separator or sewing machine oil.

4. After the engine has cooled off, remove the spark plugs and pour one tablespoonful of SAE-50 lubricating oil of a good grade into each cylinder. Crank the engine two or three times to distribute the oil over the cylinder walls. Then replace the spark plugs.

5. Remove the valve housing cover and flush the valves, rocker arms and push rods with SAE-50 oil. (If any evidence of rust is found, remove it before lubricating.) Replace the valve housing cover.

6. Plug up the end of the breather pipe and exhaust pipe.

7. Remove the oil filter element. (If any evidence of rust is found on the center stud, clean thoroughly.) Replace the old filter element with a new one and flush out any sludge from the filter base as instructed *on page 21.*

8. Drain the fuel from the fuel tank and carburetor, and clean out the fuel strainer glass bowl.

Caution! Gum will eventually form in the fuel tanks, lines and carburetor if the unit is not used. Gum in carburetor jets and passages affects engine starting. Gum can be dissolved with acetone or a 50-50 mixture of alcohol and benzol.

9. If the tractor is equipped with a storage battery, remove the battery and place it on a rack in a cool room and check the battery at least once a month for water level and specific gravity; *see page 56.*

Starting Engines That Have Been in Storage

1. Remove the spark plugs and pour a mixture of one-half gasoline and one-half light lubricating oil into each cylinder (two tablespoonfuls per cylinder is enough).

2. Remove the valve housing cover and flush the valve and valve operating mechanism with the same mixture.

3. Crank the engine rapidly until excess oil has been blown out of the spark plug holes. This operation will loosen any tight piston rings and wash old gummy oil from valves and pistons.

4. **Tractors with magneto:** Flush out the impulse coupling with kerosene, and lubricate as specified.

5. Drain the crankcase and flush out with kerosene or flushing oil and fill with specified lubricating oil. (*See "Lubrication Guide."*)

6. Be sure the lubricating oil filter has a new element before starting the engine.

7. Remove the crankcase breather pipe plug and the exhaust pipe plug.

8. Install the spark plugs after cleaning and setting the gaps.

9. Fill the water cooling system.

10. Fill the fuel tanks.

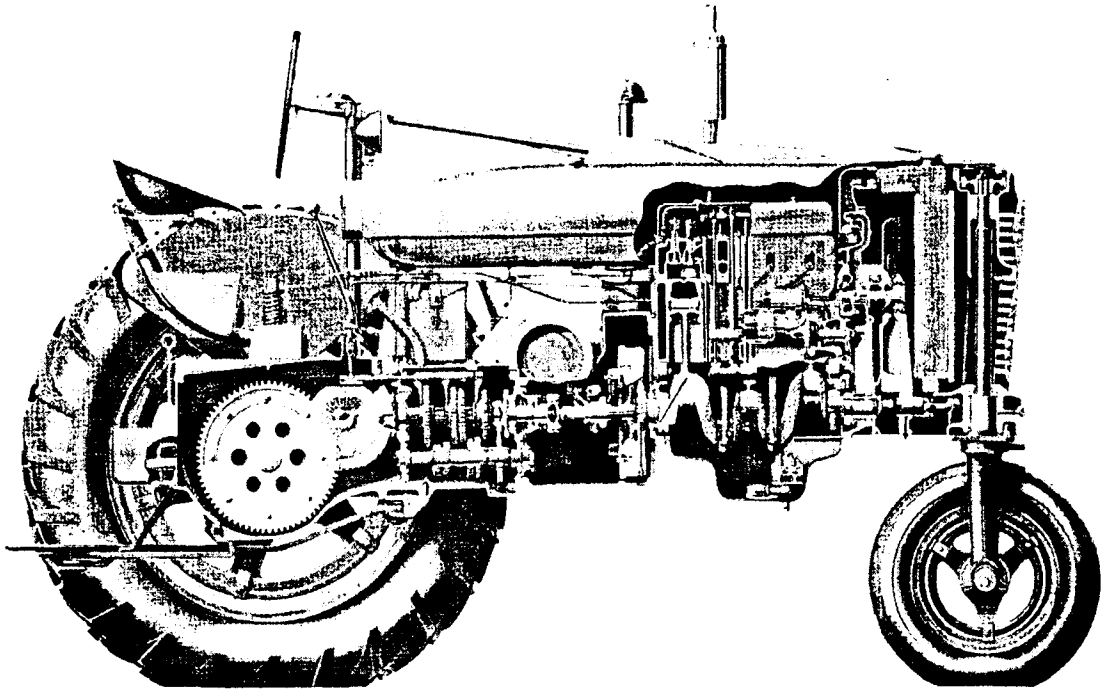
11. Install a fully charged battery (if used) and be sure the proper connections are made.

12. Clean the air cleaner and refill the oil cup.

13. Start the engine and let it run slowly; observe if any valves are sticking. If so, pour a small quantity of kerosene on the valve stem until loose.

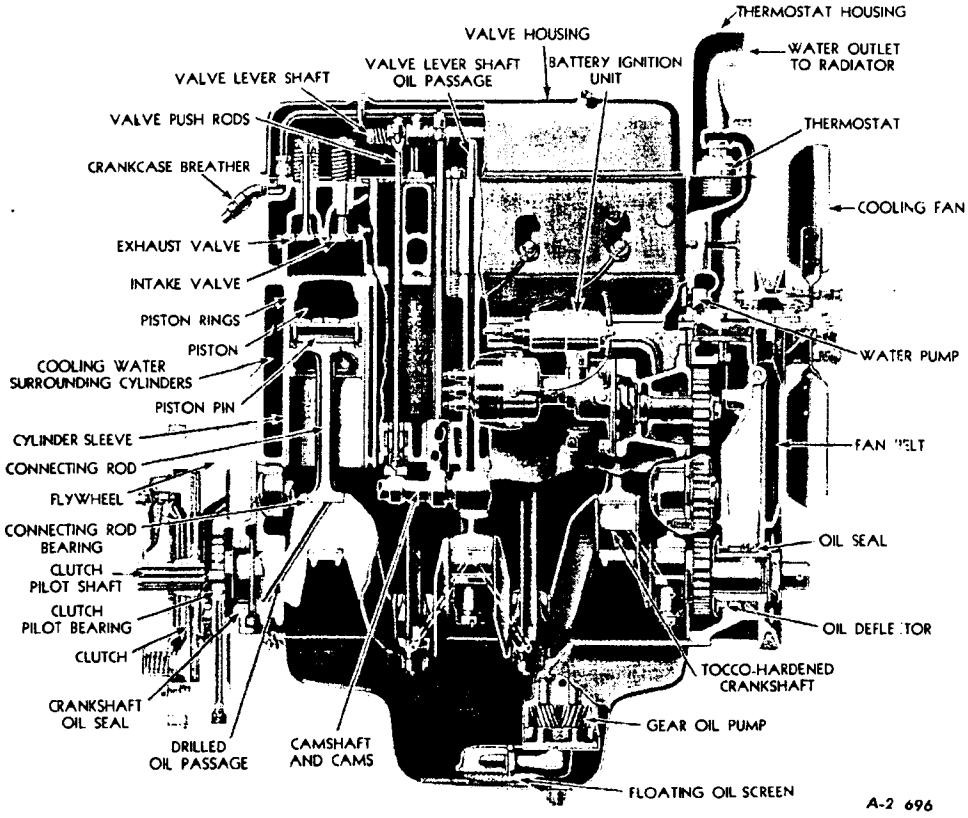
14. Assemble the valve housing cover.

Caution! Do not accelerate the engine rapidly or operate at high speed immediately after starting.



A-26539

Cutaway view of Farmall M.



Cutaway view of engine.

SPECIAL EQUIPMENT

The tractor is used for so many different types of work and is called on to operate under so many different conditions that a considerable variety of special equipment is necessary to adapt it to the varied requirements of the user.

The tractor, as regularly supplied, is equipped to perform straight drawbar work. Beyond that the special equipment requirements are so diverse that it is impractical to include any such equipment regularly on the tractor. In many cases you would be paying for equipment you do not need or want.

These special attachments can be installed on the tractor at any time, and once installed become a permanent part of your tractor.

Below is an index of the special equipment available. The instructions for operating and maintaining these attachments have been incorporated into the instructions for operating and maintaining the tractor. Supplemental information will be found in the following pages. You are urged to read and study this information in order to assure satisfactory service.

Special equipment must not be ordered from this manual. To order attachments, consult your International Harvester dealer, giving the tractor and engine serial numbers.

Types of Equipment	Attachment Number		Page No.
	Farmall M	Farmall MV	
Air Pipe Extension	62 973 D	62 973 D	82
Belt Pulley	49 265 DB	49 265 DB	84, 85
Collector Pre-Cleaner	59 096 D	59 096 D	82
Combination Rear Light and Tail Light	355 914 R92	355 914 R92	89
Cultivator Shifter Lever	49 194 DA	49 194 DA	86
Drawbar, Swinging	49 204 DB	.....	90
Drawbar, Quick-Attachable, High Hitch, Heavy-Duty	.....	353 287 R91	91
Exhaust Muffler	353 020 R92	353 020 R92	83
Exhaust Pipe Extension	53 556 D	53 556 D	83
Fan, Blower (Reverse Flow)	256 354 R91	.....	82
Fenders, Rear Wheel	51 499 DA	51 499 DA	87
Front Axle, Adjustable, Wide (with Adjustable Wheelbase)	57 067 DD	.....	82
Fuel Tank with Fuel Trap	58 190 DAX	58 190 DAX	84
Hydraulic Lift-All	15 075 EDX	15 075 EDX	85
Piston, 5,000 Ft. Altitude (Gasoline)	57 320 D	57 320 D	84
Piston, 5,000 Ft. Altitude (Distillate)	55 425 D	55 425 D	84
Piston, 8,000 Ft. Altitude (Gasoline)	55 425 D	55 425 D	84
Piston, 8,000 Ft. Altitude (Distillate)	55 427 D	55 427 D	84
Power Take-Off	66 413 D	68 671 D	89, 90
Pre-Screener	353 412 R91	353 412 R91	83
Radiator Shutter	57 572 DB	57 572 DB	82
Rear Axle, 100-inch Tread	52 148 DB	.....	86
Rear Axle Extension	353 323 R92	.....	86
Remote Control	353 231 R91	353 231 R91	85
Seat, De Luxe Upholstered	354 156 R91	354 156 R91	88
Seat, Hydraulic	351 928 R94	351 928 R94	88
Seat Pad, Detachable	351 440 R92	351 440 R92	88
Seat Spring (Heavy Operator)	354 672 R91	354 672 R91	89
Seat Spring (Light Operator)	354 673 R91	354 673 R91	89

SPECIAL EQUIPMENT

Types of Equipment	Attachment Number		Page No.
	Farmall M	Farmall MV	
Spark Arrester	51 579 D	51 579 D	84
Speed Attachment—Low-Low	60 216 DA	.....	86
Speed Attachment—7 m.p.h. Fourth Speed Forward	62 400 DA	62 400 DA	86
Tire Pump, Pneumatic (Enginair)	39 604 DA	39 604 DA	86, 87
Tire Pump, Pneumatic (Schrader)	39 622 D	39 622 D	86, 87
Tire Pump Kit, Pneumatic (Schrader)	350 342 R91	350 342 R91	87
Wheels, Front			
Single Wheel, Pneumatic			
(For 6.50–16 Tire)	49 197 DB	.....	91
(For 9.00–10 Tire)	49 199 DA	.....	91
Single Wheel, Steel			
(For 6.50–16 Single Pneumatic Tire)	67 878 D	.....	92
(For 9.00–10 Single Pneumatic Tire)	67 880 D	.....	92
(For Dual Steel Wheels)	67 879 D	.....	92
Dual Wheels, Steel	354 792 R91	.....	92
High Skid Rings (2 inches)	354 087 R92	.....	92
High Skid Rings (2½ inches)	53 015 D	.....	92
Wheels, Rear			
Wheels, Steel			
(51 x 8 inch—Standard)	354 793 R91	.....	93
(51 x 10 inch—Heavy-Duty)	354 759 R91	.....	93
(51 x 2 inch—Channel Rim)	354 748 R91	.....	93
Extension Tire (51 x 6 inch)	49 236 DB	.....	93
Spade Lugs (Standard or Heavy-Duty Wheels)			
(5 x 3 inches wide—56 Lugs)	57 460 D	.....	93
Spade Lugs (Heavy-Duty Wheels)			
(6 x 3 inches wide—56 Lugs)	66 112 D	.....	93
Spade Lugs (Extension Tire)			
(5 x 3 inches wide—28 Lugs)	58 039 D	.....	93
(4 x 3 inches wide—28 Lugs)	66 247 D	.....	93
(6 x 3 inches wide—28 Lugs) (Heavy-Duty Rear Wheel)	66 248 D	.....	93
Spade Lugs—32 Lugs (Channel Rim Wheel)	66 331 D	.....	93
Spade Lugs—64 Lugs (Channel Rim Wheel)	66 330 D	.....	93
Overtire and Rim			
(For Spade Lugs 4 x 2½ inches wide)	57 945 DA	.....	93
(For Spade Lugs 5 x 3 inches wide)	57 951 D	.....	93
(For Spade Lugs 6 x 3 inches wide)	66 276 D	.....	93
Overtire (3½ or 4-inch width)			
(For Spade Lugs 4 x 2½ inches wide)	53 017 DA	.....	93
(For Spade Lugs 5 x 3 inches wide)	57 947 D	.....	93
(For Spade Lugs 6 x 3 inches wide)	66 275 D	.....	93
Weights, Front Wheel			
First Set	48 600 D	60 197 D	94
Second Set	48 602 D	60 198 D	94
Weights, Rear Wheel			
First Set	49 329 D	49 329 D	94
Second Set	49 330 D	49 330 D	94
Third Set	49 331 D	49 331 D	94

Adjustable Wide Front Axle With Adjustable Wheelbase

Farmall M

This attachment adapts the tractor to work in potatoes and other vegetable crops where the rows are spaced too close for regular wheels. The axle is adjustable for treads of 57 inches to 81 inches. With the attachment mounted in the short wheelbase position, the wheelbase is 90 inches. Mounted in the long wheelbase position, the wheelbase is 100½ inches.

Note: When cultivator attachments are to be used on tractors with the adjustable wide front axle, it is necessary to use the cultivator shifter lever attachment. *See page 86 for further information.*

Radiator Shutter

A radiator shutter is highly advantageous for cold weather operation.

Note: This attachment consists of radiator shutter and controls. When this attachment is installed, the proper heat indicator must also be installed unless your tractor is already so equipped.

Blower Fan (Reverse Flow)

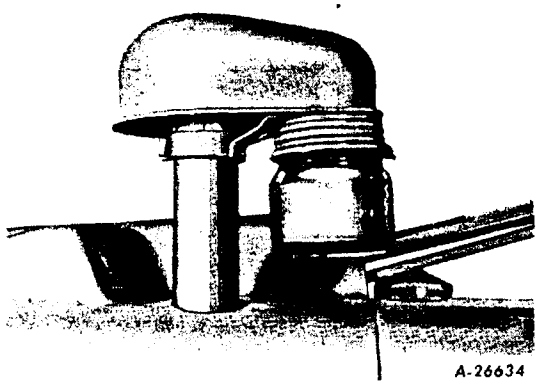
Farmall M

This attachment consists of a six-bladed fan which pushes the air through the radiator and aids in reducing the amount of chaff and trash accumulating on the radiator.

Air Pipe Extension

The air intake pipe regularly supplied is located high enough above the ground for most operating conditions. However, when heavy dust clouds continually envelop the breather pipe, it is best to add an air pipe extension. It gets the air screen above the dust, providing a fresher and cleaner supply of air for the engine, which means longer tractor life and better performance.

Collector Pre-Cleaner

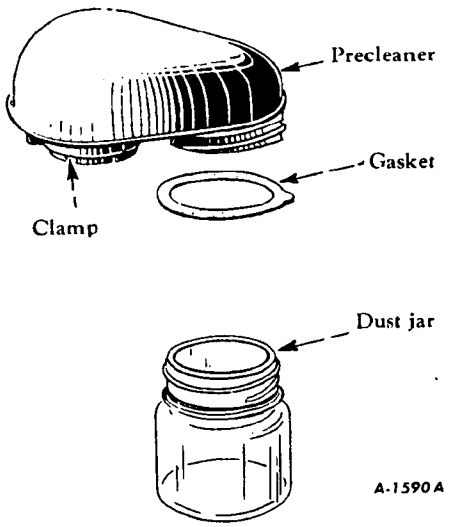


Illust. 82
Collector Pre-Cleaner.

The collector pre-cleaner is recommended as added protection when working under excessively dusty conditions.

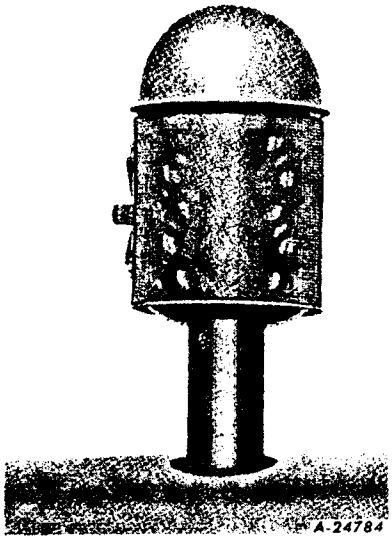
To Clean

Remove and clean out the dust jar frequently, at least before the jar becomes three-quarters full. Remove the pre-cleaner and inspect the fins regularly. When the fins become dirty or oily, wash the entire pre-cleaner in kerosene. Replace the gasket and tighten the jar securely.



Illust. 82A
Collector Pre-Cleaner disassembled for cleaning.

Pre-Screener



Illust. 83

Pre-Screener assembled on tractor.

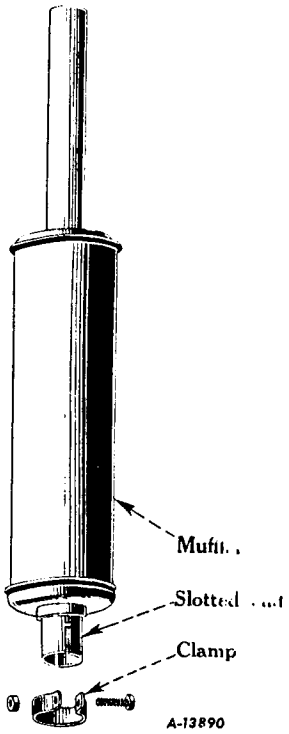
This attachment replaces the regular air intake cap on the air cleaner and provides a means of overcoming or lessening plugging of the air cleaner caused by lint, corn stalk leaves, bean fuzz, etc. Remove the screen whenever necessary and clean thoroughly with a brush.

Exhaust Muffler

The laws of most cities prohibit the use of a tractor without an exhaust muffler (*Illust. 83A*) in residential districts or near schools and hospitals because the roar of an open exhaust is disturbing and objectionable.

Exhaust Pipe Extension

The purpose of this attachment (*Illust. 83B*) is to direct the exhaust fumes above the operator's head. It consists of a 24-inch steel tube "A," which is attached by slipping the slotted end over the regular exhaust pipe and fastening with clamp "B."



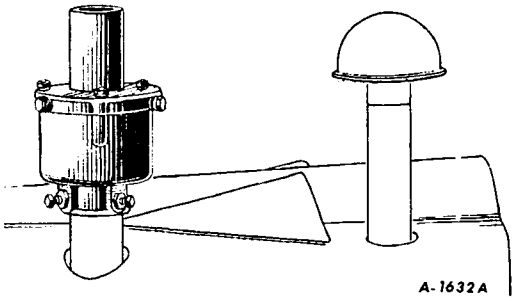
Illust. 83A

Exhaust muffler.

Illust. 83B

Exhaust pipe extension.

Spark Arrester



Illust. 84

Spark arrester.

The spark arrester is mighty valuable insurance against fire hazards. Its use is advisable when operating near dry underbrush and inflammable material in forests, oil fields, grain fields, or any place where there is a possibility of fire from an exhaust spark. A spark arrester throws the exhaust gases into a cyclonic motion which causes any sparks or hot carbon particles in the exhaust to be smothered.

Remove and clean once a month by turning the spark arrester upside down and shaking it until the loose particles are removed. -

High Altitude Pistons

High altitude pistons for use at elevations of 5,000 and 8,000 feet are available on special order.

5,000-Ft. Altitude Pistons

(Gasoline Operation)
(Distillate Operation)

8,000-Ft. Altitude Pistons

(Gasoline Operation)
(Distillate Operation)

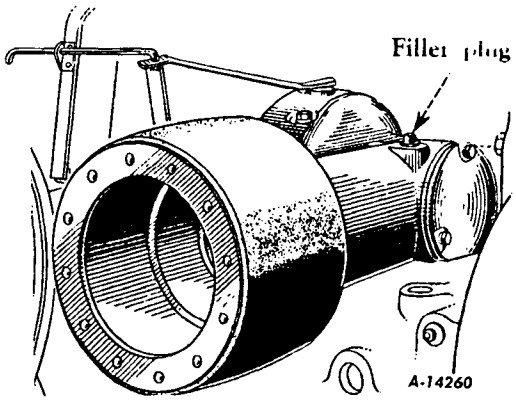
Note: These 5,000 and 8,000-ft. attachments consist of a complete set of cylinder sleeves and pistons.

For installation, see your International Harvester dealer.

Fuel Tank with Fuel Trap

This attachment is designed to permit the operation of tractors in hilly country with a minimum amount of fuel in the tank.

Belt Pulley



Illust. 84A

Belt pulley assembled on Farmalls M and MV.

This attachment supplies ready and economical power for operating numerous types of equipment.

Lubrication

To assure immediate lubrication of the new parts, remove the filler plug (*Illust. 84A*), pour a small quantity of approved transmission lubricant in the reservoir in belt pulley housing (approximately 1 pint, U. S.), after which the proper level is maintained from the oil in the transmission case. Replace the filler plug. It is necessary to put in this additional lubricant only at time of assembly. *Refer to page 30 for approved lubricant.*

Note: When operating tractors on belt work with the front of the tractor higher than the rear, it is important that the correct oil level be maintained in the transmission. Check and add oil when necessary.

Operating the Belt Pulley

The gearshift lever must be in neutral position when operating the belt pulley.

Disengage the clutch and move the pulley control lever back until the gears are in mesh; then slowly engage the clutch. The belt pulley is started and stopped by the same clutch as the tractor; therefore, be sure to disengage the clutch before moving the pulley control lever.

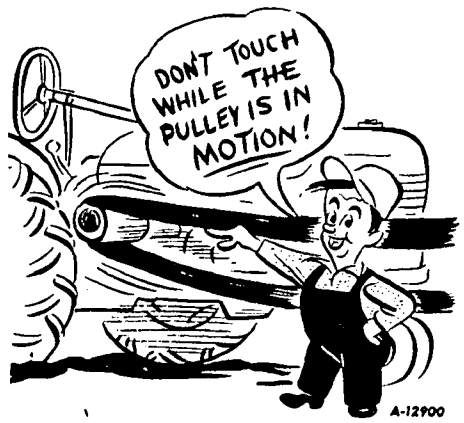
Belt and Pulley Speeds

The regular pulley has an 11-inch diameter with a 7½-inch face. Shaft speed is 899 r.p.m. (under full load), which gives a belt speed of 2,588 feet per minute. There is another pulley available that has a 13-inch diameter with an 8½-inch face. This pulley, with a shaft speed of 899 r.p.m. (under full load), gives a belt speed of 3,058 feet per minute. The low idle speed is 263 r.p.m. and the fast idle speed is 988 r.p.m. (no load).

Belt Pulley Specifications

Diameter (inches)	Face Width (inches)	Pulley Speed (r.p.m.)	Belt Speed—Feet Per Minute Farmalls M and MV
*11	7½	899	2588
13	8½	899	3058

** Regularly supplied with belt pulley attachment.*



Don't put on or remove the belt from the belt pulley while the pulley is in motion.

Hydraulic Lift-All

Farmall Hydraulic Lift-All saves time and backache by using the power of the engine to raise and lower plows, middlebusters, planters, cultivators and other direct-connected implements. Hydraulic Lift-All can be supplied in three ways: regular lift for raising the entire machine in one operation; delayed lift which controls the rear section independently of the front, and selective lift which raises either side independently when working in "point" rows.

The following power cylinders and delayed lift valve are available on order for use with the Hydraulic Lift-All attachment.

1¾ x 8-inch cylinder.
2¼ x 8-inch cylinder.
3 x 8-inch cylinder.
Delayed lift valve.

Remote Control

The Farmall Remote Control Attachment is used in conjunction with Farmall Hydraulic Lift-All. The attachment consists of an auxiliary control valve complete with connections and control rod, a break-away coupling complete with hoses and brackets, and a 3½ x 8″ hydraulic (push-type) cylinder with hydraulic stop.

When in use, the Remote Control cylinder is mounted on the pull-behind implement. When not in use, it may be disconnected from the tractor at the break-away coupling and stored away, or it can be left on the implement for future use. If desired, the break-away coupling and hoses may also be removed by disconnecting the two hoses at the control valve and removing the break-away coupling and the hose shield. Then insert two ½″ pipe plugs in the control valve openings.

The cylinder has a stop valve which controls the length of the piston's stroke. The stop collar on the piston rod actuates the stop valve which limits the travel of the piston rod. The collar can be adjusted to vary the piston's stroke, which in turn varies the maximum working depth of the implement

Cultivator Shifter Lever

This attachment is for use with Farmall shifting-gang cultivators. It enables the operator to shift the gangs sidewise quickly, in checkrowed crops, by merely turning the steering wheel to the right or left.

Lubrication

Lubricate the auxiliary lever daily or after every ten hours of operation. Use pressure-gun grease (chassis lubricant) and apply two or three strokes with the hand lubricator, or sufficient grease to flush out the old grease and dirt.

Speed Attachment (Low-Low)

Farmall M

This attachment provides a special low gear for Farmall M tractors when used with Harvester-Threshers in heavy conditions.

Caution: A set of first and second front wheel weights must be used if the tractor is equipped with the low-low speed attachment, to prevent the front wheels from lifting off the ground when the tractor is pulling a heavy load.

Speed Attachment (4th Speed Forward—7 m.p.h.)

This attachment is only for tractors equipped with pneumatic tires. It consists of a special 3rd and 4th speed driving gear and a special 4th and 5th speed sliding gear which replace the gears regularly supplied for the 5 m.p.h. fourth speed.

It utilizes the extra pulling power of the fourth speed and also increases the speed from 5 to 7 m.p.h. for highway hauling when the load is too heavy to be suitably handled with the high fifth speed. It is also very useful for high speed work with harrows, rotating hoes, etc.

We recommend that your International Harvester dealer install this attachment.

100-Inch Tread Rear Axle

Farmall M

The wide-tread rear axle attachment is used on the Farmall M only. This attachment consists of a set of two longer rear axles which, when applied on the tractor, increases the tread of the rear wheels from a maximum of 88 inches (regular) to a maximum of 100 inches.

Rear Axle Extension

Farmall M

This attachment is available for Farmall M tractors equipped with pneumatic tires and either a standard rear axle or 100″ tread rear axle for use with the HM-1 Sugar Beet Harvester for certain row spacings.

The attachment consists of an extension shaft and a two-piece clamp, which provides a maximum right hand rear wheel setting of 67″ as measured from the center line of the tractor to the center line of the rear wheel tire.

Pneumatic Tire Pumps

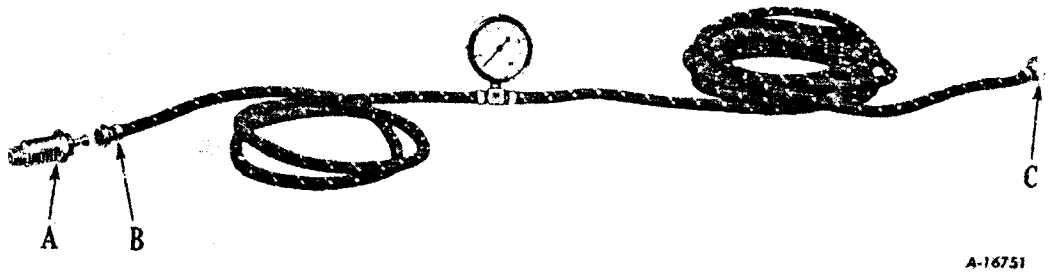
Enginair or Schrader

These tire pumps are useful where air service is not easily available. They may be used for inflating tractor, truck, or automobile tires.

Note: These tire pumps may be used with any carbureted type engine, but they cannot be used on Diesel engines. The tire pumps also are available for various spark plug thread sizes. Specify the size of spark plug thread when ordering.

If these pumps are to be used for inflating tires on a Diesel-powered tractor, a carbureted engine of another unit must be used as the source of power.

To Use: Remove one of the spark plugs from the tractor engine, or any carbureted engine having the correct spark plug thread size, and replace with the pumping element "A." *See Illust. 87.* Attach one end of the pump hose "B" to the pumping element and the other end "C" to the valve stem of the tire to be inflated. Start the engine and run it at low speed for maximum efficiency.



Illust. 87
Enginair tire pump with 16-ft. hose and air gauge.

Schrader spark plug tire pump kit: This kit consists of items which are necessary for proper care of the tire valve and maintenance of proper air pressure. With this kit you can maintain tire pressure on all tractors, trucks and passenger cars by changing adapters on the tire pump to suit the spark plug thread size.

The following items are packed in a serviceable metal box:

One tire pump with 16 feet of hose and an air gauge for registering pressure up to 100 pounds.

Five adapters for spark plug thread sizes of 10 mm., 14 mm., 18 mm., 7/8-18 and 1/2-inch.

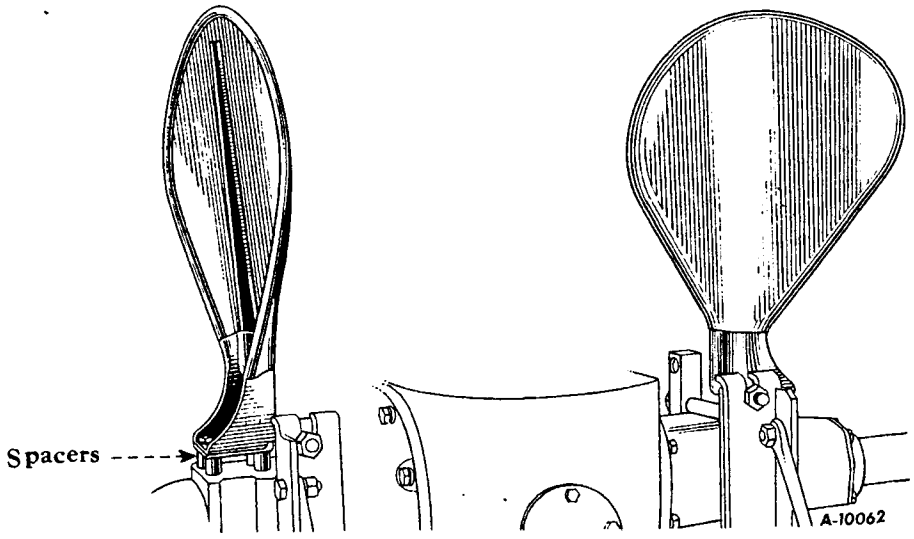
Five valve cores and five valve caps which fit all standard tire valves (packed in small metal boxes).

One valve repair tool and one valve fishing tool.

One air-water tire valve and one air-water adapter.

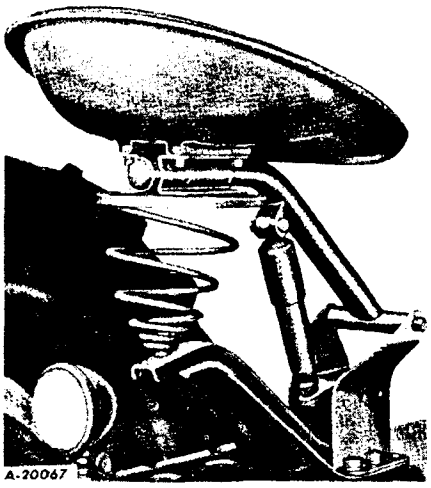
One tire pressure gauge for air-water tractor tires.

Rear Wheel Fenders
(Set of Two Fenders)



Illust. 87A
Fenders assembled on tractors having either pneumatic or steel wheels.

Hydraulic Seat



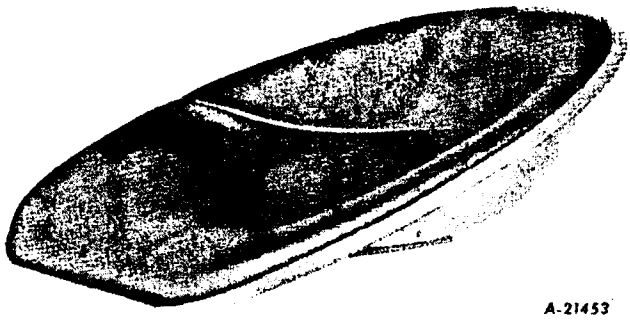
Illust. 88
Hydraulic seat.

The hydraulic seat enables you to ride as comfortably as relaxing at home in your easy chair. It takes the jolts and jars out of the roughest going . . . gives you "*feather-cushion*" comfort so that you remain unfatigued even at the end of a long day's run. It is built on the same principle as the seats developed for use in tanks and military vehicles. Users everywhere acclaim it as the smoothest-riding, most comfortable and satisfactory seat ever put on a tractor.

The position of the seat can be adjusted to suit the operator by moving the seat bracket backward or forward on the rear frame cover, and inserting the cap screws and lock washers, fastening them securely.

De Luxe Upholstered Seat

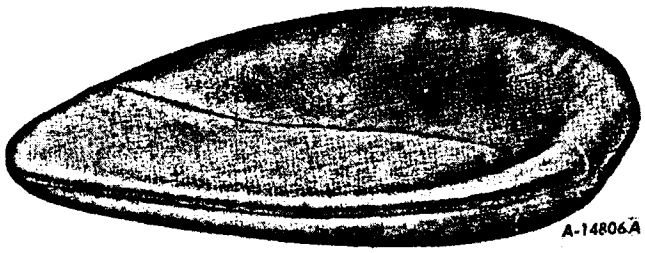
The de luxe upholstered seat is used to replace the regular seat when the maximum in riding comfort is desired. It consists of foam rubber padding covered with Silver Shade "Koroseal" upholstery which has excellent water repellent and wear resisting qualities.



Illust. 88A
Upholstered seat.

Since the Silver Shade finish has a tendency to reflect rather than absorb the sun's rays, the seat will remain cooler, thereby adding to operator's comfort for hot weather operation.

Detachable Seat Pad



Illust. 88B
Detachable seat pad.

The detachable seat pad can be used to re-cover the regular seat or the de luxe upholstered seat. It is secured in place with drawstrings. The seat pad, like the de luxe upholstered seat, also has the foam rubber padding and Silver Shade "Koroseal" upholstery.

Seat Spring Attachments

These attachments, consisting of a special conical spring which is interchangeable with the standard spring on a hydraulic type seat, will accommodate a lightweight or a heavyweight operator, depending on which spring is ordered.

The following chart shows the weight accommodated when the springs are compressed to a normal height of 5 inches and comparative data of the regular production spring. The springs can be identified by the number of notches in the top coil as shown in the chart.

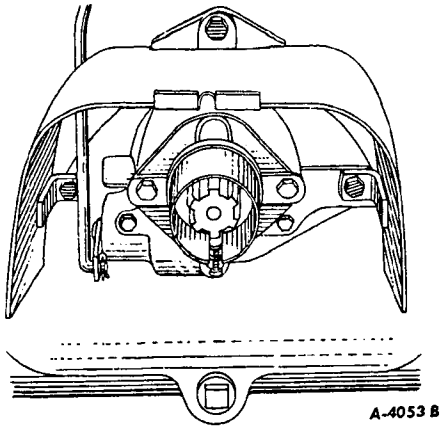
Application	Weight Accommodated	Number of Identifying Notches
Heavyweight operator.....	220 lbs.	5
Lightweight operator.....	140 lbs.	3
Regular spring.....	180 lbs.	4

Combination Rear Light and Tail Light

This attachment, which is interchangeable with the rear light, consists of a light with both a white and red lamp for field or highway use respectively.

It is controlled by a selective switch located on top of the light.

Power Take-Off



Illust. 89
Power take-off and master shield assembled on the tractor.

The Farm Equipment Institute Advisory Committee of Engineers, in cooperation with the American Society of Agricultural Engineers, developed standard specifications for the power take-off, master safety shield, and drawbar hitch point to assure a safe and properly operating hitch. These standard specifications are known as the A.S.A.E. Standard Power Take-Off.

This standard was submitted to and has been adopted by practically all farm tractor and implement manufacturers. With tractors and pull-behind power-driven machines built to these standards or converted to them, it is possible to use any make and kind of power-driven machine with any make and model of tractor.

The power take-off for your tractor conforms to standard dimensions and will operate any implement built to these standards. Implements that do not conform to these standards may be adapted to your tractor by means of conversion packages. To secure conversion packages, consult your local dealer handling your make of equipment.

Note: Farmall MV tractors have standard power take-off shafts, but do not conform fully to A.S.A.E. standards due to their construction as high clearance tractors.

To Operate the Power Take-Off

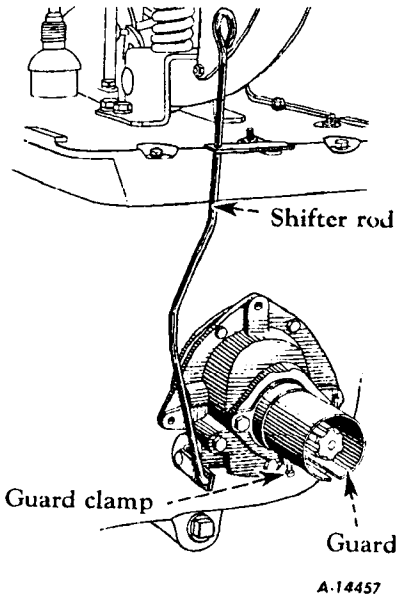
Tractor in motion: Press the clutch all the way in to disengage the engine clutch and pull the power take-off shifter rod all the way up. Shift the transmission to the speed desired; then slowly engage the clutch. The power take-off is started and stopped by the same clutch as the tractor; therefore, be sure to disengage the engine clutch before moving the power take-off shifter rod.

Tractor standing still: The gearshift lever must be in neutral position.

Disengage the engine clutch and pull the power take-off shifter rod all the way up; then slowly engage the engine clutch.

When operating the power take-off, be sure that the master shield is always in place covering the power take-off exposed shaft.

Stop the power take-off before dismounting from the tractor.



Illust. 90

Power take-off housing with guard assembled

Caution: When power take-off is not in use, assemble the guard (*Illust. 90*) to the power take-off housing by tightening the attached clamp.

Dimensions

Power take-off shaft governed speed (maximum) (full load)	537 r.p.m.
Power take-off shaft governed speed (low idle) (no load)	157 r.p.m.
Power take-off shaft governed speed (fast idle) (no load)	591 r.p.m.
†Drawbar extension plate (top—above ground at hitch hole, with drawbar in next to lowest position) — M	6⅛"
†Height of shaft end above ground — M	26¾"
†Height of shaft end above ground — MV	39⅛"
End of power take-off shaft ahead of drawbar hitch hole — M	14"*
End of power take-off shaft ahead of drawbar hitch hole — MV	16 1/16"*

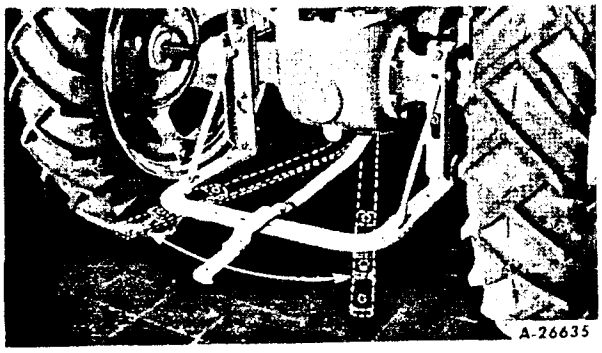
†*Based on* {*11-38 pneumatic tires—M*; *10.00-36 pneumatic tires—MV*}

**When using drawbar extension plate.*

Swinging Drawbar

Farmall M

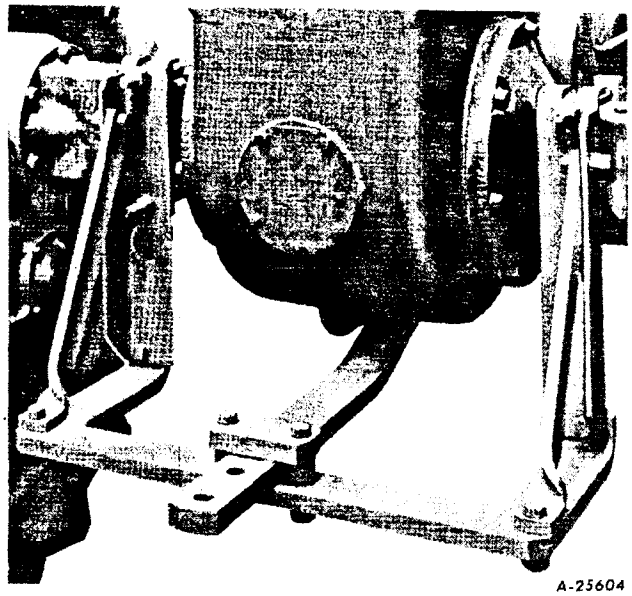
The swinging drawbar is free to swing the full width of the regular drawbar, making it easier to turn the tractor under load when pulling trail-behind implements such as disk harrows. It also facilitates steering on the straightaway when the tractor is pulling a heavy load. The load exerts less sidewise pull on the tractor and therefore interferes less with the steering. This attachment is especially desirable when working in small, irregularly shaped fields.



Illust. 90A

Swinging drawbar assembled on the Farmall M.

Quick-Attachable High Hitch Heavy-Duty Drawbar



Illust. 91
Drawbar assembled on Farmall MV tractor.

Farmall MV

This attachment (*Illust. 91*) is available for Farmall MV tractors equipped with or without an implement rockshaft and is primarily designed for use with cane carts or wagons.

The drawbar tongue is clamped rigidly at the center line of the tractor. The fixed distance from the ground line to the underside of the drawbar tongue, based on 10-36 cane field tires, is as follows:

26"—with implement rockshaft brackets in place.
25 9/16"—without implement rockshaft brackets.

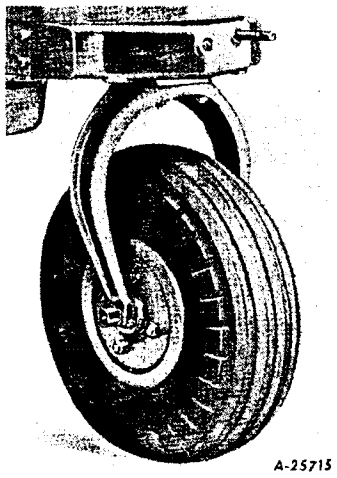
Single Front Wheel—Pneumatic

(Tires and tubes are not included)

Farmall M

Two attachments are available; one is for 7.50-16 tires and the other for 9.00–10 tires.

Pneumatic tire single front wheel attachments are used in cultivating crops grown in narrow row spacings.



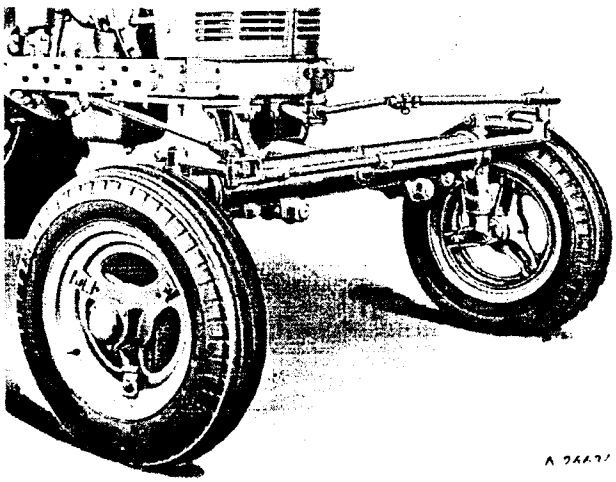
Illust. 91A
Single front wheel.

Dual Front Wheels—Pneumatic

(For 6.00-16 and 6.50-16 tires—tires and tubes are not included)

Farmall M

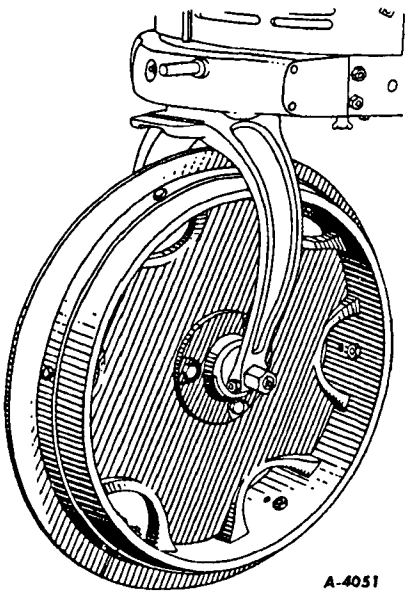
This attachment is used with the adjustable wide front axle.



Illust. 91B
Dual front wheels.

Single Front Steel Wheel

(26-Inch Diameter)



Illust. 92

Single front steel wheel attachment with steel skid ring.

Farmall M

The single front wheel attachments were designed to provide a single front steel wheel, with skid ring, to replace single front wheel pneumatic tire equipment. The following attachments are available:

For Farmall M equipped with 9.00–10-inch single front wheel pneumatic tire equipment.

For Farmall M equipped with 7.50–16-inch single front wheel pneumatic tire equipment.

For Farmall M equipped with dual front steel wheels.

If your tractor is equipped with pneumatic tires and you desire to change to steel wheels, see your International Harvester dealer or the nearest IH District Office for full details.

Lubrication

The single front wheels should be lubricated daily or after every ten hours of operation.

Use pressure-gun grease (chassis lubricant) and apply two or three strokes of the lubricator, or a sufficient amount of grease to flush out the old grease and dirt.

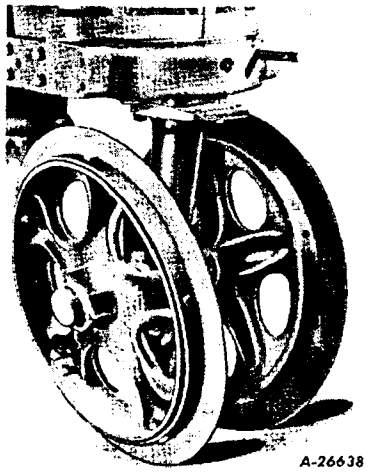
The grease fitting is located on the end of the front axle and is shielded by the front axle nut.

Dual Front Wheels—Steel

Farmall M

Dual front steel wheels for use with either 2-inch or 2½-inch high skid rings (*Illust. 92A*) are available if desired to replace dual front wheel pneumatic tire equipment.

Front Wheel Skid Rings



Illust. 92A

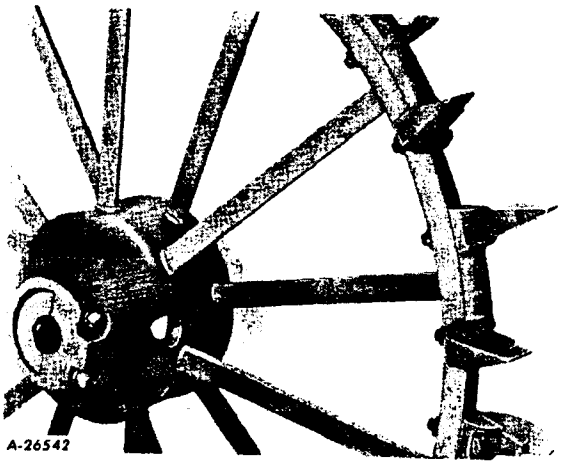
High skid rings assembled on the front wheels.

Farmall M

Front wheel skid rings, 2 inches and 2½ inches high, are available for front steel wheels. *See Illust. 92A.*

The 2½-inch high skid rings provide better control when operating in wet ground or when an extra-heavy implement is mounted on the rear of the tractor. The rings cut into the soil and make steering easier.

Rear Wheel—Steel



Illust. 93

Channel rim rear wheel with double spade lugs.

Farmall M

(51 x 8-inch) Standard Rear Wheel—less lugs.
(51 x 10-inch) Heavy-Duty Rear Wheel—less lugs.
(51 x 2-inch) Channel Rim Rear Wheel—less lugs (two required per tractor).

Note: *See "Rear Wheel Spade Lugs"* for lugs available for the above steel rear wheels.

Rear Wheel Spade Lugs

Farmall M

Special Lugs for Standard (IH) or Heavy-Duty (French and Hecht) Steel Rear Wheels

5 inches high x 3 inches wide (56 lugs)

Special Lugs for Heavy-Duty (French and Hecht) Steel Rear Wheels

6 inches high x 3 inches wide (56 lugs)

Spade Lugs for Extension Tire

5 inches high x 3 inches wide (28 lugs)
4 inches high x 3 inches wide (28 lugs)
6 inches high x 3 inches wide (28 lugs) (For use with Heavy-Duty Steel Rear Wheels)

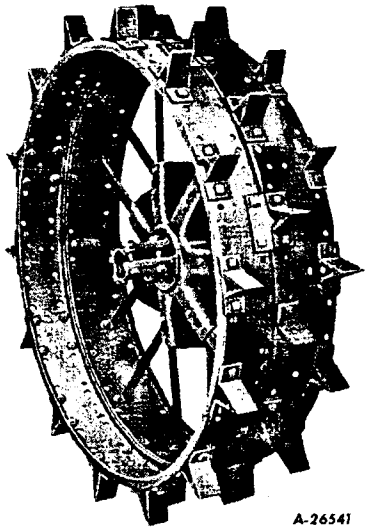
Double Spade Lugs (32 Lugs) for 51 x 2-Inch Channel Rim Rear Wheels

Single Spade Lugs (64 Lugs) for 51 x 2-Inch Channel Rim Rear Wheel

Rear Wheel Extension Tire (51 x 6 inch)

For Farmall M Equipped with Standard (IH) Steel Wheels

This attachment improves the traction of the tractor when operating in soft or sandy soil.



Illust. 93A

Extension rim, with lugs, on standard steel rear wheel.

Note: *See "Rear Wheel Spade Lugs"* for lugs available for the extension tire.

Overtire and Rim Attachments

For Farmall M with 51-Inch Diameter Rear Wheels

For Farmall M with spade lugs 4 inches high by 2½ inches wide.

For Farmall M with spade lugs 5 inches high by 3 inches wide.

For Farmall M with spade lugs 6 inches high by 3 inches wide.

The overtire attachments provide a 3½ or 4-inch smooth surface for tractors with lugs to prevent damage to road surfaces, etc.

The overtire and rim attachments provide a 6-inch surface where this is required.

Overtire (3½ or 4-Inch Width)

For Farmall M with 51-Inch Diameter Rear Wheels

3½-Inch Overtire

For Farmall M with spade lugs 4 inches high by 2½ or 3 inches wide.

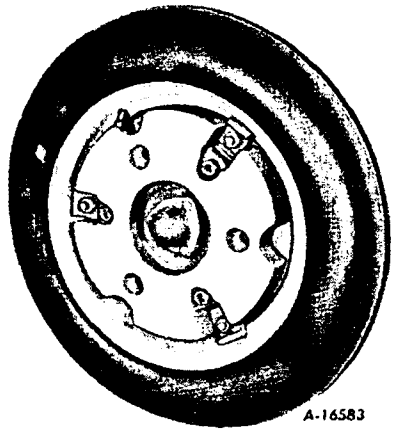
For Farmall M with spade lugs 5 inches high by 3 inches wide.

4-Inch Overtire

For Farmall M with spade lugs 6 inches high by 3 inches wide.

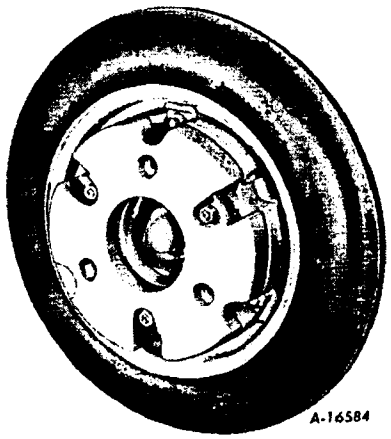
Front Wheel Weights

For Farmalls M and MV Equipped with Pneumatic Tire Front Wheels



Illust. 94
First front wheel weight assembled on the tractor.

The front wheel weights weigh approximately 42½ pounds each for the Farmall M; and 73 pounds each for the Farmall MV, and either one or two can be attached to each front wheel. To increase steerability, front wheel weights are recommended for use as a front end counterbalance whenever heavy loads are superimposed on the drawbar, or when heavy equipment is to be mounted on the rear end of the tractor. The front wheel weight attachment includes a set of two weights and the necessary attaching bolts, nuts and lock washers. If additional weight is desired a second set of weights is available for attaching to the first weights.



Illust. 94A
First and second front wheel weights assembled on the tractor.

For Farmall M

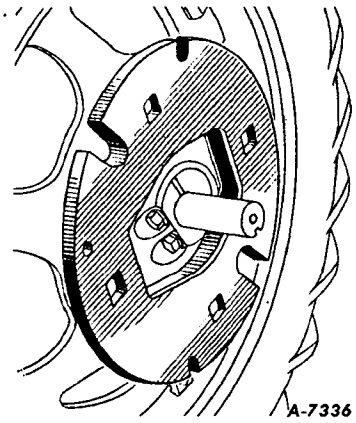
(First, 42½ lbs. Each) (Set of Two)
(Second, 42½ lbs. Each) (Set of Two)

For Farmall MV

(First, 73 lbs. Each Approx.) (Set of Two)
(Second, 73 lbs. Each Approx.) (Set of Two)

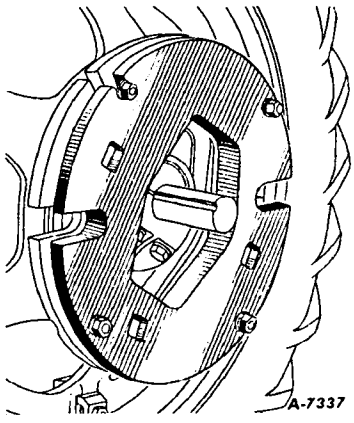
Rear Wheel Weights

For Farmalls M and MV Equipped with Pneumatic Tire Rear Wheels



Illust. 94B
First rear wheel weight assembled on the tractor.

(First, 145 lbs. Each) (Set of Two)
(Second, 145 lbs. Each) (Set of Two)
(Third, 145 lbs. Each) (Set of Two)



Illust. 94C
First and second rear wheel weights assembled on the tractor.

SPECIFICATIONS

Capacities	Farmall M	Farmall MV
Cooling system	6 gal.	6 gal.
Fuel tank	21 gal.	21 gal.
Gasoline starting tank (with distillate or kerosene engine)	⅞ gal.	⅞ gal.
Crankcase pan	2 gal.	2 gal.
Transmission and differential case	13 gal.	13 gal.
Steering gear housing	1 pt.	1 pt.
Air cleaner oil cup	2¼ pt.	2¼ pt.
Rear axle drive housing (each)	.....	3 qt.
Engine		
Cylinders	4	4
Bore	3⅞ in.	3⅞ in.
Stroke	5¼ in.	5¼ in.
Engine speeds: Minimum speed (governed)	400 to 450 r.p.m.	400 to 450 r.p.m.
Maximum idle speed (no load)	Approx. 1,595 r.p.m.	Approx. 1,595 r.p.m.
Maximum (full load)	1,450 r.p.m.	1,450 r.p.m.
Battery ignition unit (clockwise rotation, 40° advance)	IH	IH
Magneto (when so equipped) (fixed spark, clockwise rotation)	IH Type H-4	IH Type H-4
Spark plug gap	.023 in.	.023 in.
Valve clearance (engine hot)	.017 in.	.017 in.
Carburetor (with Donaldson air cleaner)	IH 1¼ in. updraft	IH 1¼ in. updraft
Clutch		
Single plate, dry disc, spring loaded	11 in.	11 in.
Fuse and Headlight Lamps		
Fuse (cartridge type) (No. 106653)	SFE-20	SFE-20
Headlight lamp (No. 142309—Trade No. 1133)	6-8 volt 32 candlepower	6-8 volt 32 candlepower
Belt Pulley		
Pulley speeds: Low idle (no load)	263 r.p.m.	263 r.p.m.
Fast idle (no load)	988 r.p.m.	988 r.p.m.
Maximum (full load)	899 r.p.m.	899 r.p.m.
Belt speed (with 11-in. pulley) (at full load engine speed)	2,588 ft. per min.	2,588 ft. per min.
Pulley diameter	11 in.	11 in.
Pulley face	7½ in.	7½ in.
Power Take-Off		
Power take-off shaft speeds: Maximum (full load)	537 r.p.m.	537 r.p.m.
Low idle (no load)	157 r.p.m.	157 r.p.m.
Fast idle (no load)	591 r.p.m.	591 r.p.m.
Foot Brakes		
External contracting band type, operated either individually or interlocked.		

SPECIFICATIONS

	Farmall M	Farmall MV
Transmission (five speed)		
Speeds based on pneumatic tire sizes	11-38	10-36
Speeds (miles per hour) 1st	2 5/8	2 1/2
2nd	3 1/2	3 3/8
3rd	4 1/4	4
4th	5 1/8	5
*5th	16 1/4	16
Reverse	3 1/8	3 1/8
*—*5th speed locked out when using steel wheels.*		
Wheels and Tread		
Front wheels, pneumatic tire size	†6.00–16	6.00–20
Rear wheels, pneumatic tire size	†11–38	13–36
Tread, front (nonadjustable axle)	8 3/8 in.	.....
Tread, front (adjustable axle)	.....	60, 63, 66 in.
Tread, rear	52 to 88 in.	69 in.
Wheelbase	89 3/8 in.	91 1/2 in.
† *Other pneumatic tire sizes are available; also steel wheels.*		
General Dimensions		
Length overall	133 1/2 in.	146 1/2 in.
Width overall: Minimum (to outside edge of rear axle)	84 1/2 in.	85 7/8 in.
Maximum (to outside edge of rear tires)	100 in.	.....
Height overall (to top of steering wheel)	78 1/4 in.	90 in.
Ground clearance for crops under front axle	.....	30 1/4 in.
Ground clearance for crops under frame	17 3/4 in.	.....
Ground clearance for crops under rear axle	25 1/2 in.	29 1/2 in. (at main frame)
Drawbar height above ground (adjustable)	14 3/8, 15 7/8, 17 3/8, 18 7/8 and 20 3/8 in. (quick-attachable type)	15, 18, and 21 1/8 in.
Drawbar lateral swing to each side of center hole	13 in. (quick-attachable type)	15 in.
Minimum turning radius (wheels in minimum tread):		
Without brake applied	8 ft. 5 in.	16 1/2 ft.
With brake applied	8 ft. 2 in.	12 3/4 ft.

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Farm Accidents can be prevented with your help

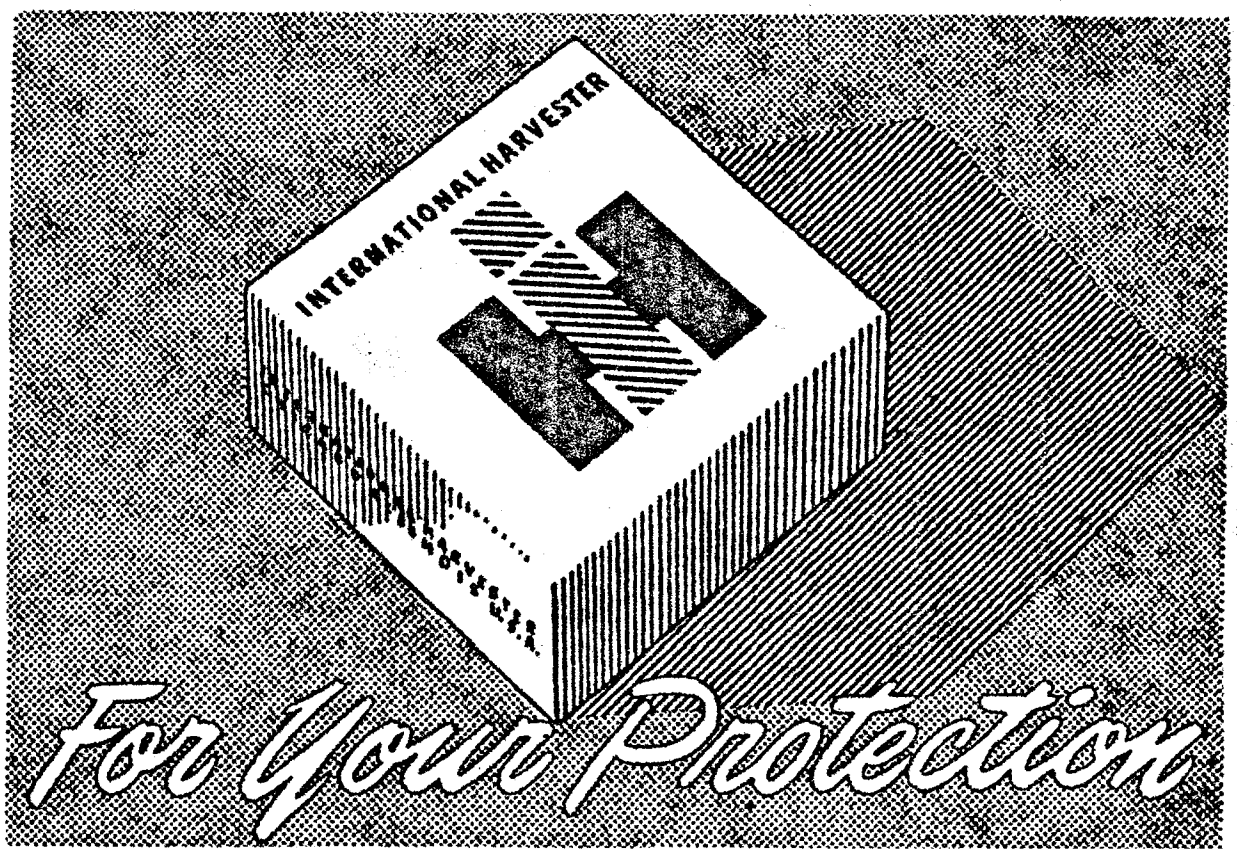
No accident-prevention program can be successful without the wholehearted co-operation of the person who is directly responsible for the operation of equipment.

To read accident reports from all over the country is to be convinced that a large number of accidents can be prevented only by the operator anticipating the result before the accident is caused and doing something about it. No power-driven equipment, whether it be transportation or processing, whether it be on the highway, in the harvest field or in the industrial plant, can be safer than the man who is at the controls. If farm accidents are to be prevented—and they can be prevented—it will be done by the operators who accept a full measure of their responsibility.

It is true that the designer, the manufacturer, the safety engineer can help; and they will help, but their combined efforts can be wiped out by a single careless act of the operator.

It is said that *"the best kind of a safety device is a careful operator."* We ask you to be that kind of an operator.

NATIONAL SAFETY COUNCIL



Always Use IH Parts

The finest engineering skill and the most advanced manufacturing methods go into all International Harvester products. Each part is built to our own high manufacturing standards. These are important things to remember when wear and tear make new parts necessary.

IH parts retain and continue the original performance you get when you choose International Harvester quality products. When replacing parts, don't handicap your equipment. For your protection, be sure to use IH SERVICE PARTS.

International Harvester dealers' bins are well stocked with IH parts. These parts departments are well-equipped service stations staffed by factory-trained servicemen. Dealers are backed in every case by the full facilities of a nearby International Harvester District Office.

When selecting new farm operating equipment, keep in mind the protective service rendered by the International Harvester dealer in your community.

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